THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. NOVEMBER 2, 1893. CHICAGO, ILL. NUMBER 44.

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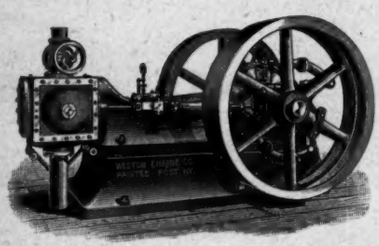

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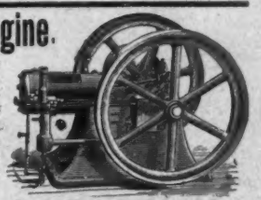

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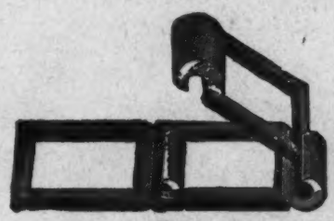

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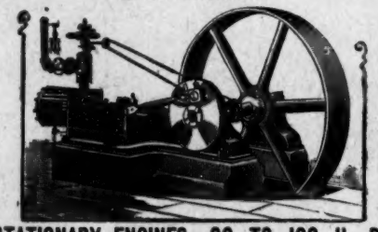

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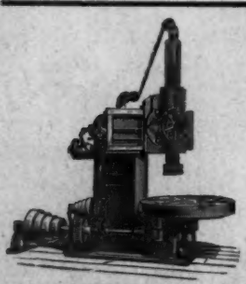

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THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. NOVEMBER 2, 1893. CHICAGO, ILL. NUMBER 44.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

It is becoming plainer that until new enterprises are undertaken with something like the old-time freedom, the iron trade will plod on in substantially the condition noted in the past few weeks. One week may differ from another in the slightly brighter outlook in a given section or in a given department of the market, but the sum total of all these occasional betterments still leaves the trade far from the desired condition. Wear and tear and the renewals that must come with time, cut an insignificant figure compared with the demand which the iron trade has learned to depend upon from the constant coming up of new enterprise, involving fresh capital and often new fields of effort. Outside of the naval work in the East and the public work in progress in various parts of the country, present demand is along well established lines from maker to consumer, and the new avenues are exceedingly few. Beyond the reports from Pittsburg, of still better employed mill capacity, there is little change in the past week. The billet market has recovered a trifle from the low level reached two weeks ago, but for the reason principally that no large tonnage is called for. Finished products do not share in any additional firmness there may be in raw steel. In the past week buyers have been able, on certain structural material contracts, to get prices $1 a ton lower than those current 10 days ago. This, with the facility with which orders are canceled and then placed elsewhere at lower prices, tends in no wise to inspire the manufacturer with any confidence in the future. In the Pittsburg district there has been an increase in pig iron consumption, but the producing capacity has also increased and the relation of supply and demand has not greatly changed. Throughout the market, sellers report that the disposition is to use up every vestige of material on hand before new purchases are made, and the clearing up policy was never so thoroughly put in practice. Buyer and seller alike look for a continuance of this policy until the new iron and steel tariff schedule is fixed, which means some months of uncertainty and cautious buying.

THE CLEVELAND OUTLOOK.

November business in ore-carrying is usually an uncertain quantity, shippers often hurrying down a considerable tonnage just at the last, but this year the indications are unmistakable that the account is now well made up. The 90 cent ore rate from the head of the lake is no temptation to boats to encounter the risks of November weather, and many are preparing to rebate their insurance and go into Winter quarters. There is as yet little basis for a prediction as to Winter operations at Lake Superior mining properties. On the Marquette range a few prominent companies will continue the present force on a wage basis lower than ever known in that region. Whether any additions will be made is entirely a matter for the future; it may be that the present inaction may be maintained until after the turn of the year. Furnacemen whose stacks have been out of blast and who are in the exceptional position of having yards clean of ore might regard the present as a good time to enter the market, but there has been no buying of late except of the small lots that are a part of nearly every week's record. It is evident that furnacemen who bought ore last Spring are not getting out even on the present market, and it is questionable if there would be any money to the good, even in smelting ores bought at the very low prices recorded in recent transactions.

Pig Iron. One additional furnace in each of the valleys is about to go in blast, for reasons not to be found in the general market for pig metal. There is only limited trading through Cleveland sales agents. In foundry iron there has been a succession of small sales lately, but buyers of this iron have no warrant for engagements long ahead. For Bessemer $11.50 is still the market. Buyers are in the market for such small lots that some makers are not anxious to meet the concessions asked. In Lake Superior charcoal iron the situation remains the same—lowest prices and limited demand. Contracting for a season's supply, by malleable concerns, seems obsolete.

Finished Material. Two weeks' traveling to secure orders sufficient for three days' operation, is the ratio between demand and productive capacity as indicated by the experience of one Ohio mill. In other quarters the situation may not be quite so bad, but the reports of prices recently made indicate the desperate effort of active mills to hang on. From the Mahoning Valley there is word that the finishers have named a committee to meet the mill owners, presumably to offer such concessions as will start some of the mills. But it is evident that valley mills must make a start before they can look for much business. They are well known to be out of the market except for their badly broken stocks, and inquiries naturally drift elsewhere. Judging from the trade Cleveland mills and warehouses have had, there is no need of any more mill capacity to take care of the bar iron market. Prices have gone to 1.35c. at mill, half extras, and this has been shaded. The structural market is a trifle weaker, the demand coming in small, scattering orders. Those involving 100 tons are as rare as 500-ton contracts in ordinary times. The condition of the nail trade is evidenced in the quotation $1.25 now made on wire nails, car load lot, at Cleveland mill—this being made possible by purchases of billets at $17.50, Pittsburgh. The HP Nail Co. is now running full, that being the only basis on which the above price can be thought of. The bolt and nut works, which were fairly active a few weeks ago, are back again in the old rut and the outlook is not encouraging.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Trade in the past week has been very light in all classes of iron and steel. The market is still a waiting one, and it is hardly likely that any large business will be transacted for some time to come. Raw iron is especially quiet, but dealers seem to be inclined to think that within a few weeks a buying movement will be started, and that business will have recovered its normal tone early in the spring of the coming year.

PIG IRON.—A sale of 500 tons of Southern coke was made in the past week, and one of 1,500 tons of Lake Superior charcoal, held by the receivers of a failed furnace, was reported to have been made, the latter at a very low figure, to go to St. Paul. Several rumors of sales of from 500 to 1,000 tons of coke iron were to be heard, but none of them appeared to be founded upon fact. In general, buying is limited to car load lots to 50 tons, and there is no immediate prospect of any very large sales being made. Prices are being fairly well maintained, but they depend quite largely upon the size of inquiries, and deliveries to be made.

BARS.—Business has been rather quiet, and no sales of any size have been made. Quotations are unchanged at 1.42c to 1.47c for iron, and 1.57c to 1.62c for steel bars, f. o. b. Chicago.

STRUCTURAL MATERIAL.—The demand is limited to small lots for immediate shipment. No large sales have been made, and there are no inquiries in the market. Prices are as last reported. Beams, 1.85c to 1.90c; angles, 1.75c to 1.90c; plates, 1.85c to 1.95c; tees, 1.95c to 2.05c.

RAILS AND TRACK SUPPLIES.—Orders continue to be small, and only for immediate needs. Quotations are unchanged. Rails, $30 to $32; track bolts, 2.55c to 2.60c; spikes, 1.90c to 1.95c.

BILLETS.—It is a settled fact that the Joliet mills are to start on billets shortly after the first of November. It is not expected that any rods will be rolled. Quotations are made at $20 for billets, f. o. b. Joliet.

SHEETS.—Only a fair demand is reported for black sheets, which are still selling at 2.75c to 2.80c, f. o. b. Chicago. Galvanized sheets have had a fairly good sale, and the quotations are unchanged at 70 and 10 and 5 per cent. discount.

MERCHANT STEEL.—There is no change in the market, which is very quiet, and the outlook for the future is not very encouraging. Prices are unchanged. Open-hearth spring steel, 2.15c to 2.25c; machinery, 2c to 2.20c; tire, 1.95c to 2.10c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

PLATES, TUBES, ETC.—Very little business has been done either in mill orders or from store. Quotations are as last reported: Tank steel, 1.75c to 1.80c; shell steel, 2c to 2.10c; flange steel, 2.20c to 2.30c; fire box steel, 3.75c to 4c; tubes, 67½ to 70 per cent. discount.

OLD RAILS AND WHEELS.—No business of any importance has been done, and the quotations given are only nominal. Old rails, $14 to $14.25; old steel rails, $8 to $10, according to length; old wheels, $13 to $14.

SCRAP.—Only a very small demand is reported, and sales have been very small. No. 1 forge, $10.50; No. 1 mill, $8; axles, $10; cast borings, $5; wrought turnings, $6.50; axle turnings, $8; mixed steel, $7; leaf steel, $14.50.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. There seems to be, if any change, a trifle stronger feeling in Bessemer iron and in soft steel billets. The latter are quoted about 50 cents above the very low figures named as the basis of transactions 10 days ago. A sale of 1,000 tons is reported at $18, and very little business is now possible below that figure. One of the leading producers of Bessemer steel has bought a large block of billets and this has affected the market to a considerable extent. Other purchases are also reported with several inquiries that involve considerable tonnage. There is a larger active blast furnace capacity in this district than for some weeks. The Edgar Thomson furnaces are now all active. Two furnaces that make for the market have started recently, one on mill iron and the other on Bessemer, to fill contracts booked some time ago. The finishing mills are running with about the same force noted a week ago. Orders now on the books will not justify operations for any length of time and new business is hard to get on a basis affording a profit. Muck bar is weak and a few small sales are reported at $21. Scrap is still very dull and mostly at buyer's price. Old iron rails have brought $15.50@$16 in the week. On the whole, the situation seems slightly improved and the feeling is better.

Cincinnati. Confidence has been restored to a considerable degree, and hoarded cash is being gradually and liberally released in ample supply to meet demands of solvent borrowers in legitimate trade. The assurance that the Senate is about to repeal the purchasing clause of the Sherman bill imparts a feeling of increased hopefulness all along the line. The extremely low prices of stocks has invited investments leading to good, healthy advances in values, and gives buoyancy to the stock market. This has resulted in an appreciable betterment of the general situation, and the metal interests have been strengthened in consequence. There is an increase of inquiries, and sales are more general and liberal. The summing up of the situation reveals unmistakably a better market, with brighter prospects.

Louisville. Prices remain about the same, with a slight tendency upward. Several sales for future delivery have been made on an advance of twenty-five cents per ton for No. 2 Foundry, while on other grades former prices are yet ruling. The Southern output is small and for these irons the feeling is fairly good. The iron made by the Spathite Iron Co. as a softener is now going into the East in competition with Ohio softeners and Scotch irons.

St. Louis. The number of inquiries from local consumers for iron to cover contracts, principally from car manufacturers, and the stove trade has given some activity to the market the past week. Purchases are confined for the most part to carload orders, and although prices are still low, there is no tendency toward a weaker market, and certain grades are in demand, even at an advance over recent quotations.

Buffalo. The market for pig iron is monotonously quiet and featureless. The output in this state is reduced to the minimum, shipments being almost entirely from stocks accumulated earlier in the year. The amount going into consumption, however, is so small that little encouragement is offered idle plants to resume. Not until present enforced economies expand into larger buying of manufactured articles may we expect much change in the tone of the iron business.

THE IRON TRADE REVIEW

DEVOTED TO

IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

PUBLISHED EVERY THURSDAY BY

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CLEVELAND, OHIO.

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B. M. GARDNER, Associate Editor and Western Manager.

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NOVEMBER 2, 1893.

VALE, EXPOSITION.

The going out of the World's Columbian Exposition is like the fading of some splendid dream. The man who has been in the midst of it, in these memorable weeks, and has gone away without feeling a sense of loss, and has taken up his work again without an irrepressible desire to return, has been little impressed by the significance of what he saw. Those to whom the Exposition has been more than buildings and machines, who have found it instinct with the highest life and the greatest achievement, will feel almost that a friend has been taken from their side. And the men whose study of the Fair and whose work in it have been most constant and arduous, are the ones for whom the last day had most of sentiment.

The inference we would have drawn is that many of the results of the Fair that are most important, are intangible and beyond any computing. The disposition will be with many, who have exhibited their products, to try to cast up the benefit and determine whether it offsets the expenditure. So much money spent on an exhibit, so many orders secured, or in the way of being secured, is the dollars-and-cents view. From that standpoint the review will be disappointing. Yet many of our machinery manufacturers can point with satisfaction to orders taken from representatives of foreign countries. It is to be remembered, however, that the representatives of foreign nations who visited the Exposition in an expert capacity, were not a medium through which business could be expected. It will remain for their reports of new processes and appliances to become generally circulated among their countrymen before the harvest will appear. In general, it is true that exhibitors who were most painstaking in educational work, who had competent men in charge of their exhibits—men who were not so chary of information that they omitted to post inquirers failing to indicate that they would soon be in the market—all such will be surest of returns that will find a place on the ledger.

Foreign countries, likewise, will profit by the Exposition according to their conception of its purpose and the liberality with which the conception was carried out. Great Britain was never more than half-hearted in her support of the Fair and her pique at protection closed her eyes to the advantages of giving all the world outside the United States an adequate idea of the extent of her resources. Russia, Austria and Germany made new revelations of their industrial importance and are bound to be gainers. Canada, New South Wales, South Africa, Jamaica, Cuba and all the Latin-American countries made good use of their opportunities and will doubtless be well repaid.

Where the narrow, sordid view of the possibilities of an exhibit prevailed, it is safe to say that the returns will be commensurate with the dimensions of the conception. The nations and the establishments whose ideas chimed with the splendid planning of the Exposition managers will find some of the success that has rewarded the large-minded plans of the directory. Seed was planted that may not yield fruit in a month or in a year; but the forces set in motion are sure in their operation. The world will not forget that the American people have produced the greatest exposition in history.

But the pity is that alongside this great object-lesson in its prosperity and power, that approaches omnipotence, the United States sends word to the world that the order is to be changed; that hereafter the American people are to reverse the policy that has built up at home and devote themselves to the interests of their competitors. And while our foreign visitors were yet with us, viewing the fruits of the old policy, at Chicago, the prophecies of the new were abroad in the land, so plain that every man could read.

ONE DIAGNOSIS OF THE TROUBLE.

We print in another column a view of the causes of the panic which has been advanced in somewhat different terms, but with a general agreement in diagnosis, by various writers upon the cause and cure of our present trouble. Our old friend "overproduction," is recognized under the somewhat altered guise of "uneven development." The letter is an interesting one and evinces careful study of the figures. Yet we must dissent from the conclusions reached, because we do not regard the premises well established. We do not accept the statement that old world development on the various lines indicated is any criterion. We do not agree that any country in Europe, or all combined, furnishes a standard of industrial health. There is nothing in the argument to show that the United States to-day is worse off than the European countries referred to, in their ordinary, normal state. Further, we do not agree that the present depression in the United States has been preceded by speculative conditions. Values in general were not inflated, but were on an exceptionally low basis.

Another point: If our industrial expansion has been too great in certain lines owing to the stimulus of protection, that fact would certainly appear in the ratio between the item "Factories" and the total of the items given. Instead of being highest in 1888, which our correspondent regards as practically the culminating point of the protection regime, the item "Factories," according to the tables quoted, is a smaller percentage of the total, in the year 1888, than in any other year in the series. Either the figures or the conclusion is at fault here, for overdone manufacturing would certainly show itself in the "abnormal" swelling of factory investments.

The theory under which protective duties have been laid is that encouragement should be given to every industry which the country will maintain, and under that theory there is no such thing as prosperity in spots. Prosperous industries mean a prosperity that extends all along the line—that takes in professional life and agriculture as certainly as it includes manufacturer and shop employe.

A BETTER DAY FOR THE FOUNDRY.

Foundry associations East and West are not the only evidences that latter-day foundry practice is having more intelligent and thoughtful attention than was given the art of molding 15 and 20 years ago. The modern foundry structure and its equipment tell the same story. The day was when the management of industrial establishments in which iron was melted and afterwards machined would point with pride to their machine shop, its complete equipment and its advantageous arrangement, while the foundry was kept from the eye of the visitors, because everywhere it was always the same choking, dusty, ill-lighted and ill-ventilated affair—strewn with broken flasks, and dingy and disordered beyond description. Times have changed. New foundries, with appliances for the comfort and convenience of molders, and for the economical performance of work, are multiplying. Heating, ventilating, lighting and labor-saving are all prime considerations. A completely-equipped foundry, with its well-placed cupola, its convenient core room, pattern rooms, stock room, its carrier of molten iron, its improved blast for heating and ventilation, and its cranes for ready handling of work, is quite as much a matter of pride as the machine shop of latest construction and well furnished with tools. True, the conservative foundryman, who appears to think there can be no successful melting of iron without gloom and broken windows and general rack, is still well represented, but there are not so many of him as we once knew.

THE profit derived from the use of bye products depends much upon whether the products so utilized are legitimately bye-products, or whether their conservation is at the expense of the principal product. Where there is a straining after the so-called bye-products of coke, for example, the tendency is to rob the coke of what it cannot part with except by making it a poorer coke. "It has been found in actual practice in this country," says an English exchange, "that the coke product was not so satisfactory when the bye-products have been all completely utilized—in other words that the bye-products can only be obtained at the expense of the coke—and on this subject blast-furnace owners and foundry owners naturally have a word to say. Bye-products for that reason have not been utilized in this country to any very large extent."

THAT the make of pig iron in the United Kingdom for 1893 will be exceptionally small, perhaps the smallest for 20 years, is the prediction made by the London *Iron and Coal Trades Review*. The depression, caused in part by the coal miners' strike, is indicated by the fact that 90 furnaces were blown out in the three months beginning with July, meaning a curtailment of nearly one-third in producing capacity. In Scotland the impossibility of getting a profit on the present basis is the cause of the curtailment. This year will go down as a disastrous one in iron the world over.

THE protests of the Amalgamated Association against the action of the Wayne Iron & Steel Co., of Pittsburg, and the Apollo Iron & Steel Co., in requiring all who go to work for them to sign an agreement not to belong to a labor organization, are well taken. Such a course by employers is as un-American and as unfair as is the requirement of the Amalgamated Association that no mill owner shall employ men who are not members of their union.

THE Douglass furnace, at Sharpsville, Pa., has blown in.

THE DUTY ON PIG IRON.

The *Bulletin* of the American Iron and Steel Association in discusing the present duty of $6.72 pir ton on pig iron, contends that it is none too high, and in the course of its article gives the following table of prices with the appended comment:

Brands.	Philad'a. October 23.	New York. October 18.	Boston. October 14.
Southern No. 1	$14.00@$14.25	$13.25@$14.25	$14.50
Southern No. 2	13.25@ 13.50	12.25@ 13.25	$13.00@$13.50
Southern No. 3		11.50@ 12.25	12.50
Southern No. 1 soft	13.50@ 14.00	12.25@ 12.50	.....
Southern No. 2 soft	13.00@ 13.25	11.75@ 12.25	.....
Southern gray forge	12.25@ 12.75	11.25@ 12.00	....

We will frankly say that there is some difficulty in comparing English and Scotch brands of pig iron with American brands, but we can not go astray if we assume that Cleveland pig iron, made in the North of England, would be the first foreign pig iron to displace Southern pig iron in Northern markets of this country if the present duty of $6.72 per ton were greatly reduced. The various brands of Cleveland pig iron closely resemble many brands of both Northern and Southern pig iron. Competing with these brands they would fix the price for others in our markets. The following are the present prices of Cleveland pig iron at the shipping port of Middlesborough, which we take from the *Iron and Steel Trades Journal* of London for October 14th.

Brands.	Price per ton.
Cleveland No. 3	35s. 0d. = $8.50
Cleveland No. 4	33s. 3d. = 8.08
Cleveland gray forge	32s. 9d. = 7.96

Comparing these Cleveland prices with the American prices given above, we find a difference of $5 and $6 in favor of Cleveland pig iron. This difference is not materially lessened by adding to the Cleveland price the cost of freight to this side of the Atlantic, which is often only nominal. Freight to-day is 5s. per ton from Liverpool to New York, and only 1s. from Glasgow. It would be perfectly fair to assume 2s. as an average freight rate on English pig iron to our Atlantic ports, so desirable is pig iron always as ballast.

If we keep in mind the fact that the present prices of American pig iron are lower than they ought to be, and lower than they can long remain without bankrupting nearly every pig iron manufacturer, making a reasonable rise in price absolutely necessary at an early day, the conclusion is irresistible that our manufacturers need the whole of the duty of $6 per ton which was provided in the Mills bill. If they are not afforded this protection against cheap English pig iron, the necessary rise in American prices referred to above would at once be taken advantage of by our English competitors, and by Scotch pig iron makers as well, who would cut under our own prices and destroy utterly the hope of better times for our now greatly depressed pig iron industry.

We look confidently to Chairman Wilson and his associates to so adjust the duties on iron and steel that when business in this country revives it shall not be for the benefit of foreign iron and steel manufacturers, but for the benefit of our own people.

THE matter at issue between the Iron and Steel Sheet Manufacturers' Association and the Amalgamated Association is in its former state. The executive committee of the manufacturers met at Pittsburg Tuesday and determined to remain firm in its demand for a 10 per cent. reduction. The result of the vote by Amalgamated lodges is still in doubt, some returns being held back. Within the week the Amalgamated Association changed back to 2 cents the base of the scale, reversing the action of two weeks ago establishing a 1½ cent card rate. With the restoration to 2 cents, a straight reduction of 10 per cent. is made.

Mr. Chas. Schaffer, of Marquette, who has control of the Excelsior furnace at Ishpeming, expects to put it in blast in the near future. He has large tracts of wood, and at the present low price of ore, expects by running at full capacity to compete with other charcoal irons.

THE Spaulding Mfg. Co., of Grinnell, Iowa, are in the market for a second-hand center crank engine, of 25 or 30 h.p., in good running order.

AMONG THE IRON MINES.

Gogebic Range :—

The total shipments from the Gogebic range by way of Ashland were 1,059,384 tons Oct. 21. For the week ending on that date the amount was 21,402 tons. Very little ore is now being shipped into the Ashland docks and 40,000 tons will cover all that will be brought down from this time out. Ashland's shipments last year were 2,227,407 tons, or more than twice what the record for 1893 is likely to be. In 1891, which was an off year, about 1,260,000 tons went from Ashland.

Menominee Range :—

The Pewabic, the only producing mine at Iron Mountain, is employing about 340 men and sending out daily about 500 tons of ore. So far this season 161,000 tons of ore have been shipped, and there is still about 13,000 tons in stock. No ore is being shipped at this time. During August 30,000 tons was mined, while the Sept. product, owing to material changes in the working force, was only 10,000 tons. The product of Oct. will be about 12,000 tons. . . . At the Aragon about 210 men are employed. No shipping is done, the ore mined going to stock; the stock-piles aggregating about 5,000 tons at this time. The sand shaft being put down for the purpose of taking care of the water, is down about 40 feet and it requires one No. 12 and two No. 10 pumps to keep the water out sufficiently to continue sinking. That the mine will work all winter is not, of course, certain, but the fact that a consignment of 5,000 tons of steam coal is arriving seems to be fair evidence that it will do so.—[Norway Current.

Vermilion Range : —

The last train load of Minnesota ore for the season has been received at Two Harbors docks. The receipts of Chandler at the docks will be increased to 2,000 tons a day, and this rate will continue until the close of the season. In the week ending Oct. 26, 10,628 tons of Minnesota grades, 11,265 tons of Chandler grades and 1,884 tons of Franklin. Total for the season, 833,755 tons—344,975 tons of Minnesota, 404,414 tons of Chandler, 12,998 tons of Zenith. Mesabi grades totaled 71,369 tons—Cincinnati Silicon, 9,939; Canton, 24,412; Franklin, 34,833; Hale, 2,176.

The rumor that the Minnesota Iron Co. would resume operations at Tower, Minn., doubtless arose from the starting of the boilers in No. 1 shaft, to save about 100,000 tons of ore in a stope in the fifth level, to which point the water had risen. Supt. G. W. Wallace is thus quoted by the *Vermilion Iron Journal*, of Tower: "There is nothing new in the situation that enables the management to form any definite conclusions as to when the mines will be started. H. H. Porter, chairman of the board of directors, is making great efforts to arrange for a resumption. Were we to receive orders to start we could not get a full force employed for three or four weeks, except in No. 8. In No. 1 there is 225 feet of water, in No. 3 fully 150 feet, in fact all our shafts have been allowed to fill. No. 8, being unusually dry, could be started in three days. We have finished shipments from the mine and have yet about 120,000 tons in stock. All our Bessemer ore, however, has gone forward. Next week we shall have less than fifty men in our employ."

Mesabi Range :—

It is reported that the Lake Superior Consolidated Iron Mines will be re-organized shortly, but that the holding of the Merritts will not be changed. One report is that the Rockefeller interests on the Gogebic and in the Spanish-American Iron Co. did not go in as originally intended. C. W. Wetmore, who had largely to do with getting the original deal in shape is said to be out of the proposed new directory, but this is denied.

John Fritz, of Bethlehem, Pa.; Samuel Thomas, of Catasauqua, Pa.; B. F. Fackenthal, of Easton, Pa., and F. B. Baird, of Buffalo, were visitors to Mesabi mining properties last week.

The Lake Superior Consolidated Iron Mines have purchased three steam shovels for stripping at the Rathbun and Adams, and for enlarging operations at the Mountain Iron. Bids for stripping work at these three properties amount to $80,000. The Mountain Iron recently mined and loaded 155 cars in a 20-hour day with one shovel.

The Oliver is now shipping 2,500 tons a day. Surface ore taken out here recently has not been within the Bessemer limit.

The Commodore mine at Virginia has closed down for the season and about 150 men are thrown out of employment. . . . Lon Merritt is authority for the statement that no contract will be let for stripping at the Mountain Iron and Rathbun properties. The Consolidated will do the work itself. . . . James Corrigan and Franklin Rockefeller were on the range this week accompanied by N. D. Moore. They visited the Franklin, Commodore and Iron King properties. There is a rumor that Messrs. Corrigan and Rockefeller are considering a proposition to lease the Iron King.—[Mesabi Range.

The total of Mesabi shipments to Nov. 1 is close to 450,000 tons. It does not now seem likely that the season's total will vary much from 500,000 tons.

Marquette Range :—

It has been decided that the work done the coming Winter at the Lake Angeline and Lake Superior mines and at the mines of the Cleveland-Cliffs Co., shall be on the basis of $1.50 a day for miners working on contract and $1 for surfacemen. The managements of these properties feel that the outlook does not justify operations, but in view of the condition of the employes, to whom a complete suspension now would mean great hardship, it was decided to continue work now going on.

The Dexter mine, near Ishpeming, has started up with a few men, and the managers believe they will find a market for their manganous ore.

The old mine of the Lake Angeline Iron company, this city, will be stopped as soon as the necessary changes can be made. Nearly all the miners will be employed at the East End mine of the company, probably, although there will be many surfacemen who will probably be left out. The old mine is too costly to handle in such times as these, and the company can secure all the ore it can find sale for from the newer property. —[Iron Ore, Ishpeming.

ON THE EDITORIAL TABLE.

"The Picturesque Side" is the title of F. Hopkinson Smith's World's Fair article, in the November *Scribner's*, in which the writer gives with pen and pencil his impressions, particularly of the Midway Plaisance. Another distinctly American article is Isaac H. Bromley's contribution to the historic moments series, giving his recollections of the "Nomination of Lincoln."

A new volume of the *Century* starts in November with a table of contents, including the names of Ralph Waldo Emerson, James Russell Lowell, Charles Eliot Norton, Colonel John Hay, George Kennan, Mary Hallock Foote, Mrs. Schuyler van Rensselaer, Edith M. Thomas and Charles Egbert Craddock. The contents include nothing more absorbing than the concluding part of the diary of the Admiral's Secretary describing Napoleon's voyage to St. Helena. Emerson's name is attached to a recently discovered unpublished poem written to Lowell on his fortieth birthday.

"The Victory of the Vigilant," by Capt. A. J. Kenealy, is one of the articles in November *Outing*,—a number giving prominence, naturally, to football and yachting. Edgar Fawcett contributes a strangely interesting story under the title "Imagination."

In the *Cosmopolitan* for November, William Dean Howells gives the first of the letters of the traveller, who has been visiting this country, from Altruria. Another feature is the portion of the magazine given up to color work, no less than ten superb color illustrations being presented for the first time in magazine history, accompanying an article by Mrs. Roger A. Pryor on "Changes in Women's Costumes." A third feature is "American Notes," by Walter Besant, who was recently in America and is doing the United States for the *Cosmopolitan* a la Dickens. There is also a new and very curious story by Mark Twain, called "The Esquimau Maiden's Romance." It is illustrated by Dan Beard.

AUTOMATIC MOLDING MACHINE.

The prejudice of workmen against labor saving machinery has had much to do, no doubt, with the slow pace at which automatic moulding machines for metal castings have been introduced in foundry work. The advance in this direction has been much more rapid of late, however, and experience has suggested improvements which have assisted in opening the way. Fierce competition, with the low prices of castings which it has brought, has done much to direct attention to new methods. The day is passing away in which the foundry is a neglected institution, filled with broken flasks, with no system of heating and ventilated only through broken windows. The foundry is coming nearer to the position the machine shop has always had in the mind of shop managers, though much is yet to be gained.

A form of steam operated molding machine is illustrated in connection with this article, that of the Tabor Manufacturing Co., of 113 Liberty St., New York, whose works are at Elizabeth, N. J. The machine is the invention of Mr. Harris Tabor, the company's superintendent. With all the automatic machines of this company, the rigid platen is used for ramming. This is made of hard wood, cut out boldly over the pattern, and without much reference to the shape of the pattern; the amount cut from the ramming head is about 50 per cent. more than the displacement of pattern for ordinary cases. By this method no skill or judgment is required in putting sand in the flask, and the density of mold over the iron may be made to suit any condition. On small work, up to flasks 24 inches square, the best results are secured from this system. A method of using flask-bars for ramming seems to suit certain conditions better than other methods. The bars are detached from the flask, and are made enough smaller so that they may be forced down without coming in contact with its walls; the flask and sand-box are filled with sand, and the bars forced down by a flat platen; the bars are deeper where the greatest ramming is required, and are made wedge-shaped at the bottom so that one bar will spread the sand until it meets the spreading influence of its neighbor. With this plan it is sometimes necessary to use a bottom board on the drag, to hold the bars when the drag is turned; the bars in the cope will hold in position against the pressure due to pouring.

Figs. 1 and 2 show the Tabor automatic duplex molding machine for making light castings. Fig. 1 represents the machine with flasks on, filled with sand, ready for ramming and Fig. 2 represents the same machine after a complete mold has been made with one operation of the machine. In this case the patterns molded are journal bearings, of brass, for railway cars of 60,000 pounds capacity.

The distinctive feature of the duplex machine, compared with the standard single machine of the same inventor, is in molding both parts of flask at one operation. It is, in fact, two machines in one and will make a complete mold, or two nowels or two copes for separate molds in the same time, and with the same operations that are required to make a half mold on a single machine.

The duplex principle permits of a great saving in molding light bench work, which has, until the introduction of this machine, been confined almost solely to hand labor. Sand will stick to cold metal patterns and often cause a break in the mold. This is avoided in the Tabor system of molding, by keeping the patterns constantly warmed by the steam used for ramming, which, in many cases, permits of dispensing with stripping-plates and using the ordinary match-plates; when this is done the match-plate is automatically drawn from the mold by the machine, the same as patterns are drawn through a stripping-plate.

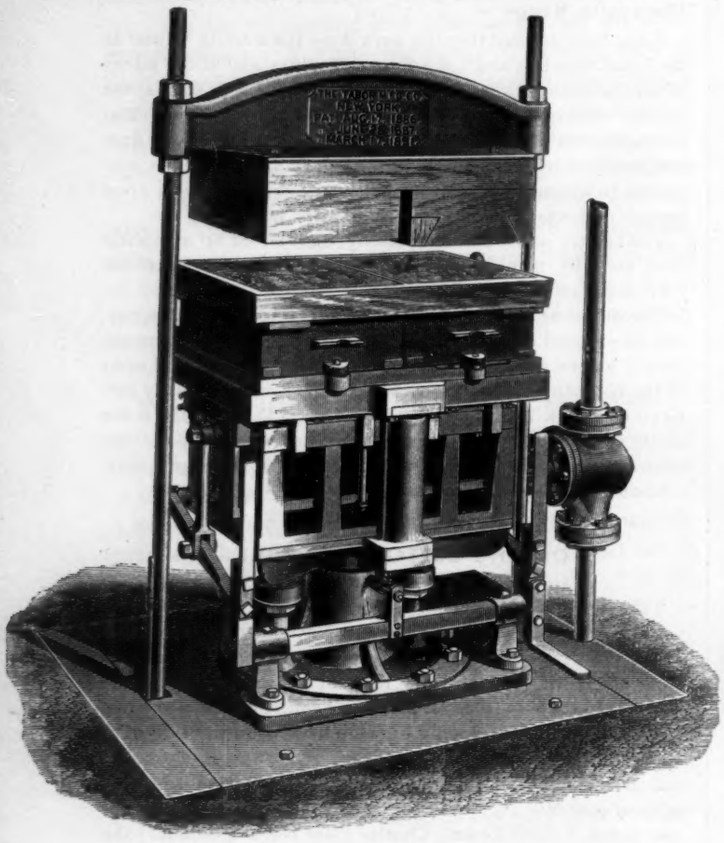


FIG. 1.

FIG. 2.

These machines will mold any size of flask within the ramming capacity of the cylinder; they will also conform to any irregular shape in flask, which is often necessary, when cheap castings are made, to save handling a needless amount of sand.

The duplex machine is designed especially for steam fittings, such as sight-feed lubricators, injectors, globe, gate, angle and check-valve bodies in brass; elbows, tees, return bends and all valve cases in iron; plumbers' supplies, such as brass fittings and iron tees, Y's and bends; sewing machine castings and hardware; agricultural implement and lighter car castings, such as brake-shoes and journal bearings, and bench work generally. The duplex may also be used as a single machine when desired, and when so used will take a much larger flask. The 16-inch machine—16 inch cylinder—when working duplex will take both parts of flask 12 x 15 inch, and when working single will take one-half of flask 15 x 24 inch. When flasks are not too heavy one man will operate a machine economically. A fair laborer, running a duplex with flasks 12 x 15 inch of average depth, should mold from 25 to 40 complete molds per hour, the number depending on the amount of core setting. An additional man on the machine would

give an increased product and would make it more economical.

The cylinder, in these machines, is below the floor line of the foundry. The piston takes steam on the under side only, its weight being sufficient to return it promptly after the mold is rammed. To the piston rod is attached the principal part of the mechanism—the machine above the floor, consisting of a table with lugs projecting upward and supporting the pattern frame, upon which rest the patterns; the stripping plate frame directly over the pattern frame and resting on it, to which the stripping plate is attached; the stool plate, suspended to the stripping plate frame and moving with it; side levers and tumbling shaft for tripping after the patterns drawn.

The operation of the machine is as follows: The half flask is put on the stripping-plate, with the sand-box to hold the sand which is to be compressed, and both are filled with sand. The ramming head is then swung forward over the flask against stops which define its position, and the throttle valve opened. The upward motion of the piston and attached parts carries the flask and sand up to the ramming head, where it is rammed instantly, and upon the throttle-valve lever being moved again, steam is cut off, and at the same time exhausted, allowing the flask to descend; the stops then engaging the free ends of side levers, and arresting the downward motion of the stripping-plate at a point about midway; the pattern, continuing to descend, is drawn from the mold, and when the piston has returned to its lowest position the sand is struck off the flask, which is then taken from the machine. As the man removes it he presses the tripping treadle with his foot to release the stripping-plate frame, which then falls to its proper position with respect to the pattern, and the machine is then ready for another mold.

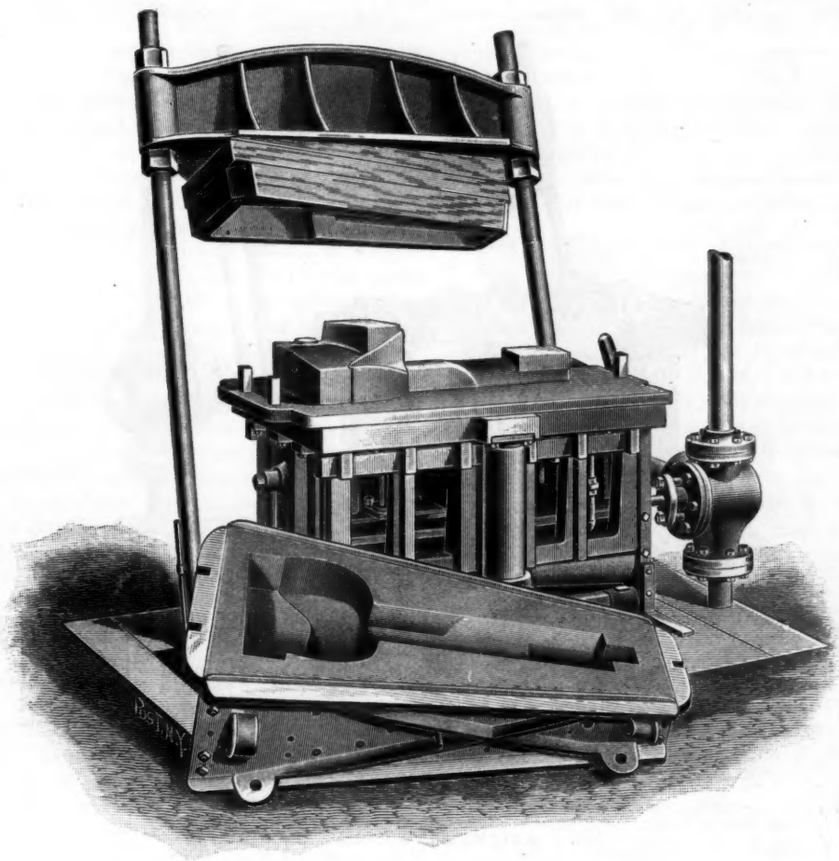


FIG. 3.—AUTOMATIC MOLDING MACHINE.

Fig. 3 shows a Tabor machine in which the mold is that of the M. C. B. standard draw bar. The dimensions show the general adaptability of the machine. The cylinder is 30″; length of flask, 41″; width at wide end, 21″; width at narrow end, 11″; depth at wide end, 11″; depth at narrow end, 6″. Fig. 4 represents a Tabor machine employed in molding steam fittings.

AT Philadelphia, 1,286 shares in Pennsylvania Steel Co., held by the Middleton estate, were appraised at $64,300.

EDUCATION AS TO STRUCTURAL STEEL.

With the movement begun for the use of steel beams in ordinary structures, a great deal has been accomplished which will be of much value if it is persistently followed up. There are many architects and builders who know but little practically of the use of steel beams. They need to be informed of the manner in which such material can be used in partial steel construction. In the construction of buildings, particularly in large cities, economy of space is often very desirable, and a steel beam will often be found decidedly preferable for that reason to a bulky wooden girder.

Beam manufacturers could very profitably to themselves follow up this educational work and instruct builders in the special advantages to be realized from the enlarged use of steel structural material. In entering this field it might be found necessary to make modifications in the shapes and sizes of beams now standard in order to meet new requirements. In the construction of dwelling houses there would, for instance, be no necessity for using the heavy beams now made. Perhaps 3 or 4 inch beams, properly stiffened by cross beams, would be found suited to a great deal of such work. Beams of this size, weighing much less than standard beams, would not be a very costly investment for owners desiring fire proof or "slow combustion" houses, although manufacturers would probably charge more for them than for the heavy sections, being more expensive to roll. There is certainly a most inviting field opening up in this direction for the beam trade and as the era of low prices for beams has apparently come to stay it is likely to prove in the future a better business in point of value than has thus far been enjoyed from the construction of large buildings.—[Iron Age.

The Youngstown Bridge Co., through its Chief Engineer, Mr. C. E. Fowler, has undertaken a good but difficult piece of work in the preparation and publication of general specifications for buildings. Very good specifications have been published for general bridge work in iron and steel, of which Clarke's, Cooper's, Bouscaren's, Thacher's and Whittemore's are most familiar. This is, we believe, the first attempt at a general specification for architectural construction. It is very well adapted to mills and warehouses, for which it seems to have been designed. The loadings for snow, wind and covering are usual,

as are the unit stresses for iron and steel. The straight line formula for compression members is that recommended by Mr. Thacher with the coefficient changed to use l in feet. The specifications for details, workmanship, materials and erection strike one as being too general to satisfy an exacting architect or inspector. They will probably be drawn closer and be made more in detail when applied to different styles of structures. The attempt to draw general specifications for buildings is certainly courageous, the structures vary so much in character and in the purposes for which they are designed. Probably it will be necessary to draft several forms to meet the demands of different structures; but the specifications of the Youngstown company fulfill every reasonable expectation, and will do much to assist architects and to insure the reasonably safe and proper construction of iron buildings.—[Railroad Gazette.

BOOKS RECEIVED.

"THE ORE DEPOSITS OF THE UNITED STATES," by James F. Kemp, A. B., E. M., Professor of Geology in the School of Mines, Columbia College. New York: The Scientific Publishing Co. The materials for this volume, which is a 300-page 12mo., were collected and arranged in connection with lectures on economic geology, the author adding to the descriptions of others, observations he had made in ten years of travel. The book is intended to supply a condensed account of the metalliferous resources of the country, which will serve as a text book and reference volume; and the author has also had in view the stimulation of further investigation and study of the phenomena with which he deals. In Part 1 are given several chapters on general geological facts, on the formation of cavities in rocks, on the minerals important as ores, the filling of mineral veins, structural features of veins, and classification of ore deposits. Part 2 takes up the ore deposits in detail. The iron series is treated in three chapters. In the second of these, under the sub-caption "Hematite, Red and Specular," are given some interesting descriptions, clearly illustrated, of the various Lake Superior ores, the illustrations being from the Republic mine on the Marquette range, the Ludington mine on the Menominee, the Colby on the Gogebic and the Biwabik on the Mesabi. The bibliography of the volume is particularly full, putting more complete detail, from original sources, within reach of the student. Furnishing in convenient and compact form the general character of the ore deposits of the United States, the volume will specially commend itself to schools of mining engineering and to the geological departments of all technical institutions.

We have received from the *Railway Age and Northwestern Railroader*, of Chicago, a cloth bound copy of their report of the "World's Railway Commerce Congress," held in Chicago June 19-23, 1893. It contains the history of the call for the congress, and the addresses delivered by the various officers and delegates. It is very handsomely gotten up, and sells for $3.00 per volume.

From the *Railway Age and Northwestern Railroader*, of Chicago, there comes also a copy of "Compound Locomotives," by Arthur Tannott Woods, M. M. E., revised and enlarged by David Leonard Barnes, A. M., C. E. The table of contents indicates that the book covers thoroughly the field for which it is intended, and as a whole it is a valuable addition to the library of an engineer. It is cloth bound; price $3.

THE programme of the second annual meeting of the Foundrymen's Association at Philadelphia, Nov. 1, included an address by the president, Mr Francis Schumann, on "The Progress of the Association," the election of officers for the ensuing year, discussion on an arrangement for chemical determinations with the University of Pennsylvania, and reports on the condition of the foundry trade.

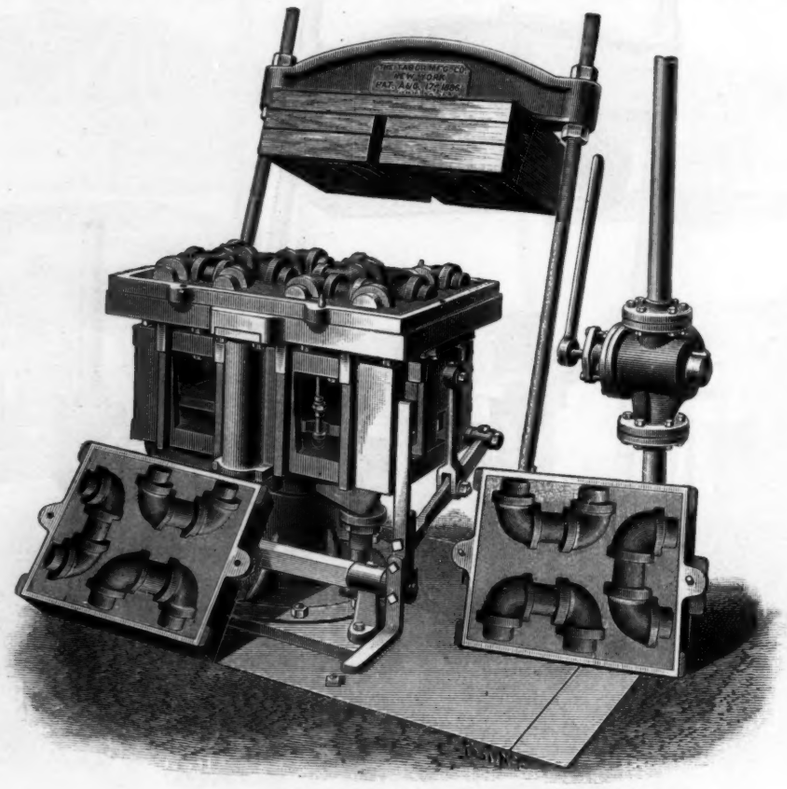


FIG. 4.—AUTOMATIC MOLDING MACHINE.

THE Chicago Steel Works Co., in which G. H. Jones, of Chicago; Philip D. Block, treasurer of Cincinnati Forge & Iron Co.; Joseph Block, president Block-Pollock Iron Co., and others are interested, will build a large plant for special steel manufacture at Chicago Heights, the well-known suburb of Chicago. Five acres of ground will be occupied and 200 men employed.

RECEIVER John E. McGettigan, of the Premier Steel Works, Indianapolis, has brought suit to set aside the $300,000 mortgage given by Chas. W. Depauw, president of the company, to the American Trust & Savings Bank, of Chicago, trustee of $300,000 of the company's bonds. Fraud in its execution is alleged.

THE Girard Iron Co., of Girard, O., makes the statement that the Biwabik ore which has constituted the greater portion of its mixture of late, requires for its reduction 15 per cent. less coke than the mixture which it previously used.

UNEVEN EXPANSION CAUSED THE PANIC.

TO THE EDITOR OF THE IRON TRADE REVIEW.

Mr. Mulhall, of London, Eng., a recognized authority and one of the most prominent statisticians of our times has produced in his "Dictionary of Statistics" for 1891, tables showing the wealth of the various nations of the world.

Among these tables can be found the following, relative to the United States.

WEALTH OF THE UNITED STATES IN MILLION DOLLARS—GOLD.

Approximately the Chief Components of American Wealth.

	1850	1860	1870	1880	1888.
Lands	3,310	6,910	8,320	10,197	12,300
Cattle	550	1,080	1,415	1,630	2,405
Railways	290	1,140	2,047	4,897	9,340
Factories	520	1,010	1,902	2,790	3,500
Houses	1,000	2 600	5,460	10,800	14,000
Furniture	500	1,300	2,730	5,400	7,000
Sundries	966	2,120	4,108	7,928	13,055
Total	7,136	16,160	25,982	43,642	61,600

It will be seen from this table that our wealth in 1888 (practically 1890) was over 61½ billion dollars. By comparison with other tables produced by the same author and stated in precisely the same kind of component parts it is apparent that the United States surpasses by far the wealth of any other nation of the earth. Great Britain stands second with 45 billions; France, third with 41 billions; Germany, fourth with nearly 31 billions; Russia, fifth with 24½ billions; Austria, sixth with 18½ billion dollars.

By this table it will be seen that in 38 years (1850 to 1888) our wealth increased over 54 billion dollars, or nine billions more than the entire wealth of Great Britain in 1890. The average increase each decade of this period was over 13½ billion dollars, which was a greater sum than the present wealth of Spain, or the combined present wealth of Sweden, Norway, Holland and Turkey. The increase of our wealth was so great as to call from Mr. Mulhall the remark following his tables: "Such rapid accumulation of wealth is unparalled in the history of the human race."

Our National debt in 1890 was about one billion dollars of which 725 million dollars was interest bearing, the balance floating. So, viewed from a National standpoint we apparently had a clean surplus above debt of over sixty billion dollars.

Right here, investigation as to the prosperity of the United States generally stops. The array of figures pointing to success as a wealth getting nation is so dazzling as to dissipate the thought of any condition other than a healthy one. Particularly is this the case with those who have reached the conclusion that the policy of tariff protection begets such glowing results and consequently is the only correct policy to pursue.

But the money getting of a nation and the active and full employment of labor in manufacturing are not all there is to it; particularly, if the possession of money comes conditioned upon an enforced expenditure of the same in investments about which there is any question as to their being judicious.

If, while acquiring this vast wealth, the joint production of *induced* investment and natural growth, we have distributed it along the lines which compare favorably with those of other nations, whose distributions of national assets are founded on centuries of experience; or, if we have disbursed it with such care and such proportions as to maintain equilibrium, then our condition is good, otherwise not.

From this table of Mr. Mulhall's is deduced the fact that our wealth in 1890 was distributed comparatively, as follows:

Lands	20	Per cent.
Cattle	4	" "
Railways	15.2	" "
Factories	5.6	" "
Houses (buildings)	22.5	" "
Furniture	11.4	" "
Sundries (Ships, Mdse., Mines, Bullion, etc.)	21.3	" "
	100.0	

From this it would be observed that we have put nearly one-half of all our wealth into the three following items:

Railways	15.2	per cent.
Houses, (buildings)	22.5	" "
Furniture	11.4	" "
Total	49.1	" "

Now, considering the fact that we are a borrowing people, I contend that these three items have absorbed too great a percentage of our assets, and are out of proportion for a healthy condition. No other nation of the first class has any such percentage of its wealth invested in these three items. The three leading powers of Europe—Great Britain, France and Ger many—average a trifle over 40 per cent. while we have over 49-

I contend, further, that in the process of creating these three items and building them to their present status, a period of wonderful activity extending over several decades, has been seen; and this period, on account of the extended time necessary to fill the country with conveniences for doing business, has led the people generally into the belief that business would continue at the same pace forever. Through this mistaken idea, we have equipped ourselves accordingly, and as if the law of supply and demand did not exist, rather than on a scale to renew, or keep in repair, after a proper limit had once been reached. While this activity was going on, involving the expenditure of over $30,000,000,000, wage workers were furnished, from these three sources, a very large share of their prosperity, and the present stagnation is due principally to the fact that we have practically reached the limit with respect to these three items; they now have developed sufficiently to cover all our present needs, to say nothing of the fact that in certian directions there has been considerable anticipation of the needs of the future. The fullness attained in this development cuts off a large share of what has been an outlet for manufactures in certain lines, leaving us now to be supplied only in ordinary current necessities.

That we have reached such a point needs no further illustration than can be found in a consideration of the item "Railways," which in 1890 had absorbed 9,340 million dollars, or 15.2 per cent. of our wealth (increased in 1893 to over 11,000 million dollars). It is self-evident that without population our railways would be utterly useless and valueless. It follows, then, that their value depends upon the average number of people to a mile of road. Notice the following table:

	1860	1870	1880	1890
Population of United States	31,443,321	38,558,371	50,155,783	62,622,250
No. of Miles of Railway	30,635	52,914	93,349	163,420
People per Mile of Railway	1,026	728	537	384

This table, based on census reports shows that the population has practically doubled since 1860. The railway mileage during the same period has increased *more than five fold*. The number of people to a mile of road in 1960 was 1,026; fell to 728 in 1870; to 537 in 1880; to 384 in 1890.

We had in 1890, 384 people to one mile of railroad; or, considering five persons to a family, 77 families to a mile, which, when taken in conjunction with the fact that each mile of railway is bonded, on the average, for thirty thousand dollars and stocked for about as much more, makes it clear that there is no room for expansion in that direction. From these facts can be deduced these proportions:

77 families to one mile of railway, to $60,000 bonds and stocks, or,
1 family to one mile of railway, to $780 bonds and stocks.

The last table above shows that between the years 1880 and 1890 over 70,000 miles of railway were built and during the same period there were added to the population in round numbers 12½ millions of people; or one mile built to 178 people added, or to 36 families of five each. This gives a proportion for that period, viz:

36 families to one mile of railway, to $60,000 bonds and stocks, or,
1 family to one mile of railway, to $1,666 bonds and stocks.

In other words, for the last decade, as often as one family of five persons was added to the population, an investment of $1,666, or thereabouts, was made in railways.

Is it not plain that manufacturing industries, having as a necessary basis of prosperity a continuance of such investment, will be doomed to disappointment.

This item of wealth, "Railways," has been selected for illustration, for the reason that it displays more fully than any other the full effect of the workings of the tariff. This item has furnished our greatest industry (iron and steel manufacturing) ample scope to display itself. After barricading against attacks from the outside, and with favorable conditions within, by reason of the absence of laws against paralleling railways, full swing is had, and incentive is present in prospective profits, to do the level best. The tariff stimulated excessive railway building, which in turn, begat excessive town building along the lines, and the two leavened the whole lump to a speculative fever. What is the result? If the answer comes from those directly benefited, who state the matter from their range of vision, the result is good, but if for answer facts and figures from an opposite range are consulted, the verdict must be far different.

In the *North American Review* for September, 1893, Mr. Andrew Carnegie says: "The country never was so prosper-

ous as during the decade between 1880 and 1890. Labor was never so fully employed, wages so high, or the necessaries of life so cheap; the masses never earned and saved so much; never was the proportion of the combined earnings of capital and labor given to and received by labor so large, and the proportion left to capital so small. Never was the foreign commerce of the country nor its infinitely more important home commerce so great. It is probable that our successors in many future decades are to look back to the past decade as the golden age of the Republic, as far as material prosperity is concerned."

This is the verdict given from a beneficiary standpoint. But is this all there is to it? How about the people as a whole? On them rests the increased burden of an investment of over ten billion dollars in railways, houses and furniture, added in this period, and swelling the aggregate of these three items far beyond that of the proportion which has obtained in other countries. At the end of this decade named—this so-called "golden age of the Republic"—the United States had acquired something like 30,000 more miles of railway than the entire 19 powers of Europe. The greater mileage carries with it the inference that greater facilities for support exist, else why the necessity? Examination reveals that Europe has four times the number of people to a mile of road; greater area; many times the wealth; larger crops; and many times the output of manufactures that the United States has, all of which contribute to the support of railways. We exceed them in mileage, but in the show for business they exceed us four to one.

The picture of prosperity drawn by Mr. Carnegie is very attractive. No sane man of any party would object to it, if it did not depend for existence upon enforced investments about which there is question as to their being judicious. Since the year 1870, certain items of our national wealth, or assets, have increased in percentage as follows: "Railways" 450 per cent; "Houses" 250 per cent.; "Furniture," 250 per cent. while in the same period the item "Lands," our greatest natural resource, has increased only 50 per cent.

A contemplation of the entire list of items of wealth, as shown by Mr. Mulhall's tables, will develop evidences of folly. The closest scrutiny will show what is necessary to correct. These items correspond to a schedule of the assets of an individual, or of a bank. It is necessary to know something more about them than simply what their aggregate is, however, dazzling. Banks make great fortunes; individuals do likewise, but, oftentimes, both are subsequently undone through lack of equilibrium in the distribution of investments. Nations, however brilliant in ideas, or fertile in resources, are not exempt from the mathematical laws.

F. H. HOLBROOK.

Muskegon, Mich., Oct. 28, 1893.

Armor Plates Resist the Drill.

A lot of armor for the new United States armored cruiser Maine, in all 400 tons, is now lying at the shops of the Bethlehem Iron Works, Bethlehem, Pa., awaiting shipment. The Maine's armor is of the Harveyized type. It has been found since the first lot of Harveyized steel has been turned out, that there are no tools fit to drill the necessary holes in the plates to permit of the latter being fastened on the ship's side. As yet no method has been discovered of placing armor on a vessel's side other than by means of bolts.

In all soft steel armor plates no difficulty is experienced in boring holes, but the hard surface of the Harveyized plates appears to defy tools. It is declared by experts that the plates can only be bored after they have been subjected to a softening treatment. This, it is pointed out, can be done by a system of gas jets, but at heavy expense.

In softening the armor plates it is made apparent that the plates must necessarily lose some of their resisting powers. It is feared that the plates so treated become little better than plain nickel steel. How to prepare Harvey plates for fitting on the side of a ship is now under investigation by the ordnance officials of the Navy Department.

THE stove foundry at New Castle, Pa., operated by Baldwin & Graham, of Pittsburg, has started up with 200 hands, after a shut-down of several weeks.

MACHINE SHOP AND FOUNDRY.

CONSTRUCTING A CUPOLA.

BY DR. EDWARD KIRK, PHILADELPHIA.

When about to construct a cupola to melt iron for foundry work, the first point to be decided is the proper location. In deciding this a number of points to be taken into consideration, the two most important of which are the getting of the stock to the cupola and the taking away of the molten iron. It should be borne in mind that there is more material to be taken to a cupola than is to be taken away from it. For this reason the cupola should be located as convenient to the stock and as possible. It must also be borne in mind that the object in constructing a cupola is to obtain fluid molten iron for the work to be cast, and if the cupola is located at so great a distance from the molding floors that the molten metal loses its fluidity before it can be poured into the mold, the cupola fails in the purpose for which it was constructed.

If the work to be cast is heavy and the greater part of the molten metal is handled by traveling or swinging cranes, the small work may be placed near the cupola and the cupola located at one side or end of the foundry near the yard. But if the work is all light hand-ladle or small bull-ladle work, the cupola should be located near the center of the molding room so that the molten iron may be rapidly conveyed to the molds in all parts of the room.

SCAFFOLD.

It is often found difficult, owing to the shape of the molding room and location of the yard, to place the cupola convenient for getting the stock to it and the molten iron away from it. When this is the case, means must be provided for getting the stock to the cupola and the cupola located at a point from which the molten metal can be rapidly conveyed to the molds. At the present low price of wrought iron and steel, a fire proof cupola scaffold can be constructed at a very moderate cost, and the difficulty of locating the cupola convenient to the yard may be overcome by constructing a scaffold of a sufficient size to take the place of a yard for iron and fuel. The scaffold may be constructed under the foundry roof and made of a sufficient size to hold one or two cars of coal or coke, a hundred tons of pig and scrap iron and all the necessary material for a cupola. The space under the scaffold can be utilized as molding floors for light work or for core benches, core oven, ladle oven, sand-bins, etc. The cupola and its supplies are then under roof and there is no trouble from cupola men staying at home in bad weather, as is often the case when the cupola and stock are out of doors.

When this arrangement is adopted, an endless chain or bucket elevator should be constructed to convey the coal or coke to the scaffold as fast as it is shoveled from the truck or car. Another elevator should be provided for pig and scrap iron and as the iron is thrown from the car it is broken and at once placed upon the scaffold convenient for melting. This arrangement saves considerable expense for labor in rehandling of iron and fuel and also prevents the loss of a large amount of iron and fuel annually tramped into the mud in the yard and lost. The saving in labor and stock in a short time will pay the extra expense incurred in constructing this kind of a scaffold.

CUPOLA FOUNDATION.

Too much care can not be taken in putting in a cupola foundation, for the weight of a cupola and stack, when lined with fire brick to the top, amounts to many tons and when loaded with fuel and iron for a heat to many tons more. If the foundation gives way and the cast iron cupola bottom is broken by uneven settling, the cupola is rendered practically worthless, for it is impossible to replace the bottom with a new one without taking out the entire lining, this entails much expense, and it is almost impossible to bolt or brace the plate so as to keep it in place.

The foundation should be built of solid stone work, and if a good foundation cannot be had, piles must be driven. Separate stone piers should never be built for each column or post, for they frequently settle unevenly and crack the bottom

plate. Uneven settling and breaking of the bottom are prevented to a large extent by placing a heavy cast iron ring upon the stone work upon which to set the cupola supports. This ring should be placed several inches below the floor to prevent it being warped and broken by the heat in the dump.

When brick walls are constructed for the support of a cupola, the bottom plate is made square, from two to three inches thick and strongly ribbed or supported by railroad iron between the walls, to prevent breaking. The walls do not admit of sufficient freedom in removing the dump and for this reason are seldom used in the construction of cupolas at the present time. Even when the cupola is set so low that a pit is required for the removal of the dump, the iron supports rre used and the pit walls built outside of them. When the round cast iron columns are employed, the plate must be made square or with a projection for each column, to admit of the columns being placed at a sufficient distance apart to let the bottom doors swing between them. The best supports for a cupola are the T shaped posts. They take up less room under the cupola and are less in the way when removing the dump than the round columns, and when slightly curved at the top, can be placed at a sufficient distance apart to permit of the drop doors swinging between them. When these posts are used, the bottom plate is made round and of only a slightly larger diameter than the cupola shell or air chamber, and when made of good iron and the foundation plate used, the bottom plate does not require to be more than 1½ or 2 inches thick for the largest sized cupola. The supports when curved at the top must be bolted to the plate to hold them in place.

HEIGHT OF CUPOLA BOTTOM.

The height the bottom of a cupola or spout should be placed above the molding floor or gangway, depends upon the class of work to be cast. For small hand-ladle work the proper height is 18 to 20 inches; for small bull and hand-ladle work 24 to 30 inches; and for large crane-ladle work three to five feet.

It is very difficult and dangerous to change ladles and catch a large stream from a high cupola in hand ladles; and when pieces are only cast occasionally, requiring the use of a large crane ladle, it is better to place the cupola low and dig a pit in front of it, in which to set the ladle when a large one is required for the work.

When the cupola is set low, room must be made for the removal of the dump. This may be done by constructing a wall in front of the cupola to keep up the floor under the spout, and lowering the floor under and around the back part of the cupola. When the cupola is so situated that this can not be done, a pit should be constructed for the removal of the dump.

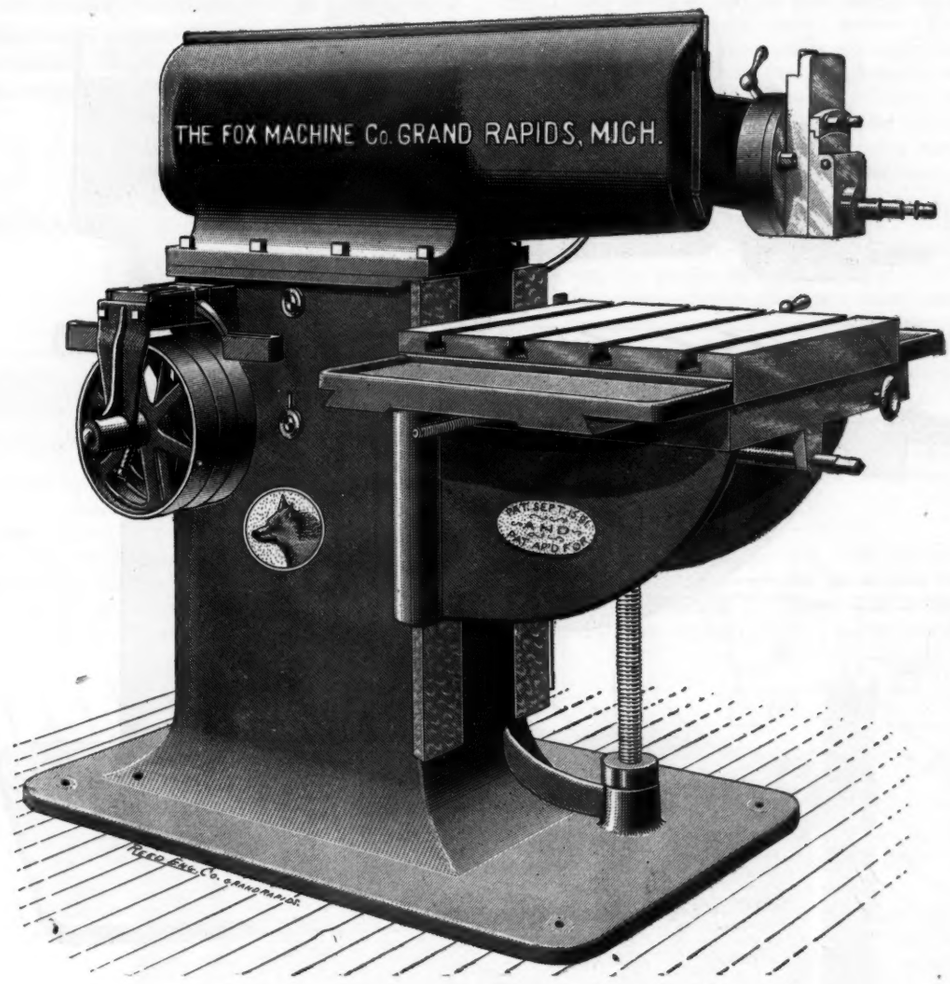
BOTTOM DOORS.

For cupolas of small diameter, but one bottom drop door is used. But when the cupola is of large diameter the door, if made in one piece, would be so large there wonld not be room for it to swing clear of the foundation without setting the cupola too high and the door would be very heavy and difficult to raise into place. For large cupolas the door is cut in the middle and one-half hung to the bottom on each side. Four and six doors are sometimes used, but they are always in the way when taking out the dump, and require more care in putting in place and supporting.

The doors are generally made of cast iron, and vary in thickness from a half to an inch and a half in thickness, and are frequently very heavy and difficult to raise into place. If the doors are large they are much lighter and easier to handle when made of wrought iron, and if properly braced answers the purpose equally as well as the stiffer cast ironone. If the lugs on the bottom plate are set well back from the opening, and the lugs on the doors made long, the doors drop further away from the heat of the dump, and may be swung back and propped up out of the way when removing the dump.

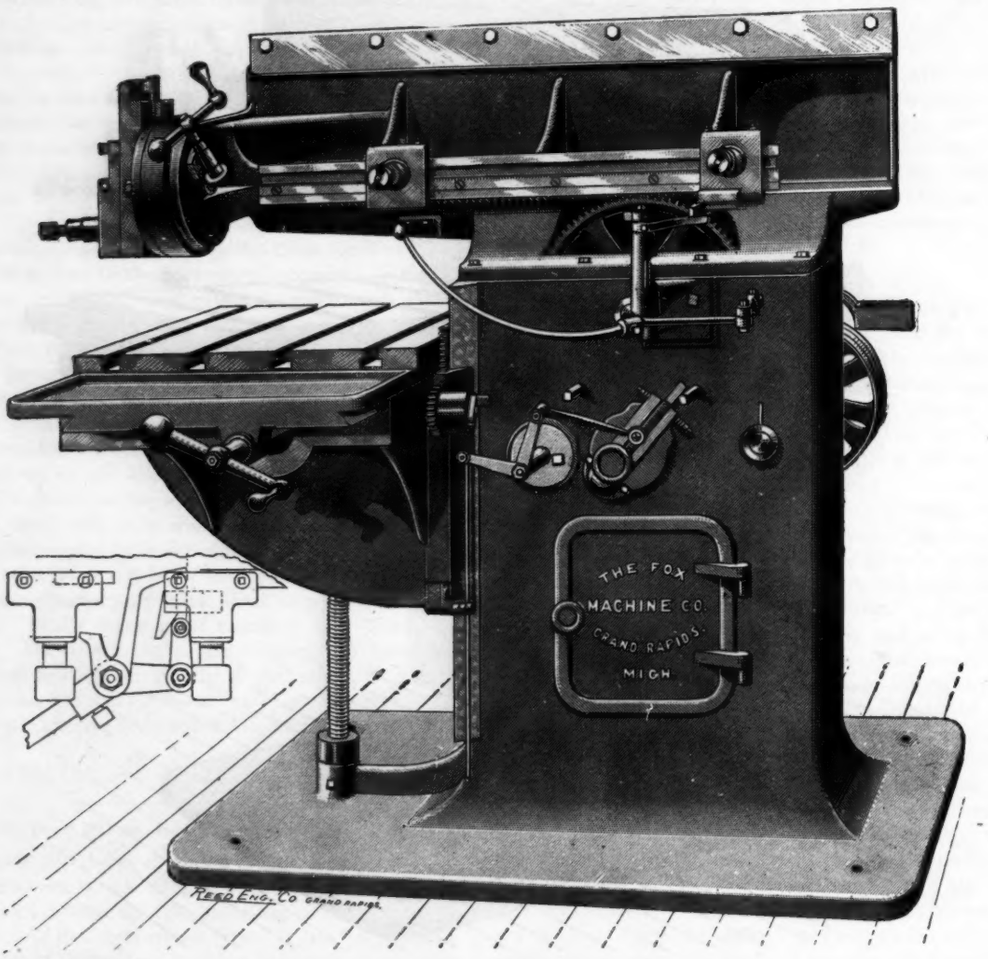
CASING.

The casing or shell of the modern cupola and stack is made of iron or steel boiler plate, riveted together with one or two



30-INCH SHAPER.—View of Left Side.—See Page 14.

rows of rivets at each seam. The thickness of the plate required depends upon the diameter and height of the cupola and stack. The lining in the stack is seldom renewed, while the lining in the cupola is often removed every few months and replaced with a new one, and the casing must be of a sufficient thickness to support the stack and lining when the cupola lining is removed. The strain upon the casing due to expansion and shrinkage is not very great when properly lined; but when improperly lined with a poor quality of fire brick, the expansion may be so great as to tear apart the strongest kind of a casing. The only way to prevent this is to take care in selecting the fire brick, and in laying up the lining. The greatest wear and tendency to rust is in the bottom sheet, and it is also weakened by cutting in the front, tuyer and slag holes, and should be made of heavier iron than any other part of the casing. Plate of ¼ inch or ⅜ inch thickness is heavy enough for almost any sized cupola. The cupola and stack casing are generally made in one piece, the cupola ending at the charging door and the stack beginning at the same point.



30-INCH SHAPER.—View of Front Side.

The stack may be contracted above or below the charging door, and made of a smaller diameter than the cupola. This gives a better draught and requires less material for casing and lining; but it also increases the number of sparks thrown from the cupola when in blast. Where sparks are very objectionable, as in closely built up neighborhoods, it is better to make the cupola and stack of the same diameter, or to enlarge the stack from the bottom of the charging door. This may be done by placing a cast iron ring upon the top of the cupola shell, and supporting it by brackets riveted to the shell and placing the stack shell upon the ring. The sparks then fall back into the cupola if the stack is of a good height, and very few are thrown out at the top.

[TO BE CONTINUED.]

30-INCH OPEN SIDE SHAPER.

A material change from the ordinary form of shaper has been made in the 30-inch open side shaper brought out by the Fox Machine Co., of Grand Rapids, Mich. When the small crank shaper evolved into the shaper of today the principal change seemed to have been in building a machine of increased proportions but of the same type. This usually calls for a ram about ½ to ⅔ inches longer than the depth of the column, so that at nearly all times the back end of the ram was sticking out of the back end of the column and received no wear whatever. Occasionally, when it was required to make a stroke of 24 or 26 inches, the back end of the ram would be drawn into the column. Having had most of its wear on the front, it would present a wedge-shape bearing, having the large end of the wedge at the back end of the ram and the small end next to the tool, so that accurate work was impossible.

The object in designing this shaper was not only to make a tool which would be quick and easy to handle, but which would do accurate work in all parts of the stroke.

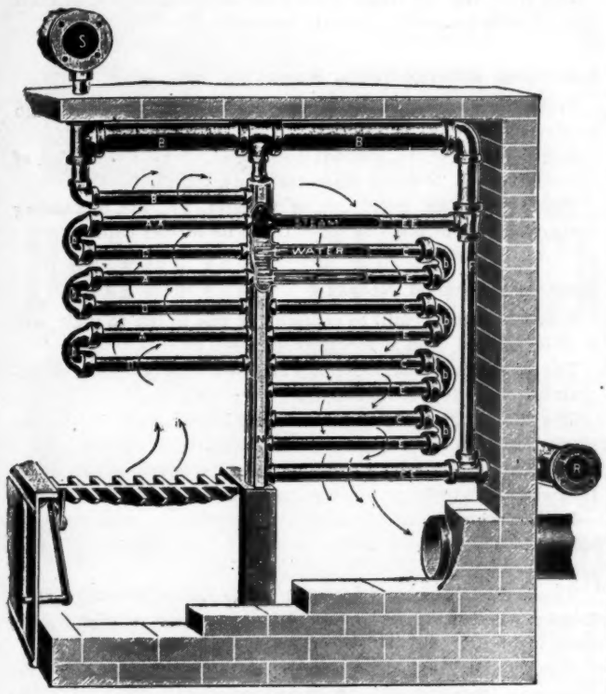
It is built substantially, weighing about 3,500 pounds. The housing which supports the ram extends out over the table 16 inches, so that when the ram is out to a stroke of 24 inches it is just flush with the end of the housing, the total length of which is 48 inches. The length of the ram is 34 inches. The housing and ram are both made in such a shape as to be strong and well braced, enabling the tool to make an accurate cut the full length of the stroke.

The table is also a new departure, being supported by the knee and $1\frac{11}{16}$ inch screw, which is set just outside the center of gravity of the table. The table, 40 inches long, has a bearing of 26 inches on the knee. The planed surface on top being 24 inches square, has a vertical adjustment of 16 inches.

The feed is positive friction, which releases as soon as the feed has taken place. The feed can be reversed so as to take place at either end of the stroke and in either direction. There is quick return stroke; three or four to one, as desired. The length of the stroke can be instantly changed from 1½ to 30 inches. The dogs are held automatically in any position no screwing being required. The belt shifter is arranged so that the belts can be readily stopped on the loose pulleys.

THE ELECTRIC BOILER.

Sectional views are given herewith of the Electric boiler made by the Electric Boiler Co., of 23 Stillson street, Rochester, N. Y. It is a horizontal tube boiler composed of heavy iron stand pipes cylindrical in form. Into these stand pipes, wrought steel tubes are screwed with right and left hand threads, with return bends at the opposite ends. The bends



THE ELECTRIC BOILER.—Sectional View.

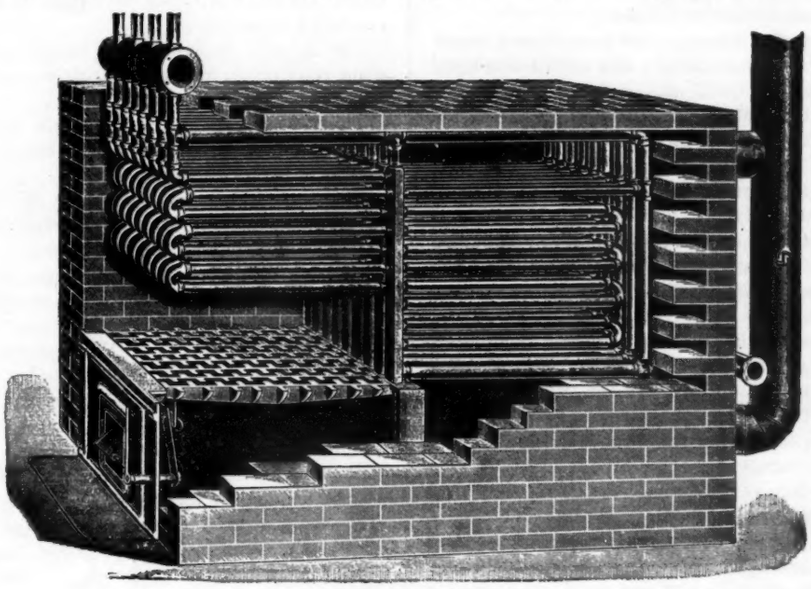
are so arranged that they bring the top pipe of one pair opposite the bottom pipe of the opposite pair in such a manner as to secure to some extent a continuous circulation of water. Each stand pipe with its complement of tubes forms a section. From the bottom of the rear side of the pipe a tube is extended outside of the brickwork or casing which connects into a flange tee or cross. These tees and crosses are bolted together, forming a header or drum to which the return pipes are connected. The top tubes, front and rear, are carried upward and connected with an eduction pipe as is also a tube from the top end of the stand pipe. The eduction pipes form the top of the combustion chamber and are extended out through the top of boiler covering, near the front end, and connected with a flange tee or cross. These tees and crosses are also bolted together forming the flow header from which the flow pipes are connected.

By this arrangement each section becomes, for all intents and purposes, a separate boiler with an action and circulation of its own. By varying the length of the tubes and the number of sections, all sizes of boilers can be furnished and in any shape desired in length and width. The arrangement of sections and method of connecting each independently of the other into the flow and return headers, admits of repairs being made in case of accident, by any ordinary steam fitter, without disturbing the rest of the boiler, as each section can be disconnected and removed with the greatest ease, repaired and replaced, or an entirely new section may be put in without losing the use of the the rest of the boiler except for such time as the section is being disconnected and reconnected.

The tubes are arranged in a partially staggered form so as to present the greatest possible surface to the action of the heat, and at the same time produce as little friction as possible in the smoke passage. The tubes project over the fire and the vertical header forming a bridge, the travel of the flame is as indicated by the full arrows, the circulation of water being shown by the dotted arrows. R is the return main and S is the flow pipe. It is claimed that this may be used as a steam or hot water boiler. A section or two may be used independently on hot water circulation, while the other part is used as a steam boiler. The heat passes upward between the vertical rows of staggered tubes on the front side of the stand pipes, passes over between their top ends, and the eduction pipes, and between the short tubes connecting them into the rear combustion chamber, downward between the rows of staggered tubes at the rear of the stand pipes and thkuce into the smoke pipe, leaving the boiler at the point where the water is the coldest, and thus parting with the greatest possible amount of heat in its downward passage.

CAPT. A. P. Baldwin, superintendent of the Akron Iron Co., Akron, O., says that in October, this year, the company's output was 178 tons; in the same month last year it was 10,000 tons. This company signed the scale in July so that it might be in position to run without interruption. The trouble has simply been a lack of orders.

GERMANY is delivering at mill steel blooms at $13.15 per gross ton. The land of wooden shoes and woman labor—surely it is not desirable for America to compete with such labor at that price or any other price. This country has more to fear from Germany importation, in case of the success of the theorist "statesmen," than from England. Germany has an overplus of scientific men who are at the top in chemistry, etc., and available to reduce cost of production by means of new processes, and of cheap labor, which must be content to live on the plainest fare and hobble around in wooden shoes. —[National Labor Tribune, Pittsburg.



THE ELECTRIC BOILER.

TOTAL World's Fair admissions, 22,000,000.

INDUSTRIAL SUMMARY.

New Construction:—

The Thomas Iron Co. have resumed work on the new No. 1 furnace at Hokendauqua, Pa.

The contract for a new zinc works at Passaic, N. J., has been let to Davis & Thomas, founders and machinists at Catasauqua, Pa.

It is expected that the new plant of the Dean Bros. Steam Pump Works at Indianapolis, double the size of the present works, will be completed by Dec. 1.

The Pittsburg Iron & Steel Engineering Co., of Pittsburg, are erecting a number of iron buildings for Wm. Clark's Son & Co., of the Solar Iron Works in that city. These buildings are three in number, being 100x100, 50x218 and 56x260 feet.

The New York Knife Co., at Walden, N. Y., are building a new fire-proof store house to be 28 feet in width and 100 feet length. The side walls will be of brick and the roof of iron, designed and built by the Berlin Iron Bridge Co., of East Berlin, Conn., covered with their anti-condensation corrugated iron.

The Philadelphia Traction Co. have placed the order for their power house with the Berlin Iron Bridge Co. of East Berlin, Conn. The side walls will be of brick and the roof will be of iron. The building is 190 feet in width and 168 feet in length, divided into boiler room, engine room and dynamo room.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

At Winona, Minn., L. Schneider has begun the construction of a new boiler works.

The Minneapolis Specialty Mfg. Co., St. Louis Park, Minn., capital stock, $40,000, has been chartered for the manufacture of cast iron specialties.

Glenn B. Ames, of New Castle, Pa., is about to start a machine shop. He has been for some time foreman of the machine shop of the New Castle Wire Nail Mill.

The Ball Bearing Car Wheel & Manufacturing Co. of Cleveland, capital $50,000, has been formed for the purpose of manufacturing and dealing in car wheels, rolling stock, machinery and conveying apparatus. The incorporators are Simon D. Wright, John W. Horusey, Henry D. Marble, Nathaniel S. Young and Alexander C. Caskey.

The Globe Tin Plate Co., Chicago, has been incorporated, with a capital of $45,000, to manufacture and sell tin and terne plate. James Spruce, 171 Canal st., can give information. The Ohio Wringer & Lawn Mower Co. has been incorporated at Springfield, O., with $15,000 capital. At Cincinnati, the G. H. Bennett Furnace Co. has incorporated; capital, $50,000; to manufacture and deal in furnaces and other heating and ventilating apparatus. At Brooklyn, N. Y., a late incorporation is the Hay, Budden Mfg. Co.; capital, $20,000; object, manufacture and sale of dies and anvils, general forging, etc. For information address James Hay, 53 First st., Brooklyn.

The newly incorporated Automatic Wind Motor Co., of Buffalo, have their plant at Blasdell, N. Y., nearly completed. The machine shop is 48x112 feet; the foundry 48x112; forge shop, 48x32; and other buildings, 18x40, 32x48, 16x32, 24x32, 18x30, 14x44, 12x44. The entire plant will be covered with corrugated iron. The cost, exclusive of the 5½ acres of land, will be $16,000. The motor is constructed entirely of iron and steel. In form it is a true propeller, and operation is automatic. It is expected that orders can be filled by early spring. The company will be in the market for a crane, emery wheels, and punching and shearing machines. It has not yet made its purchases of pig iron and coke. The office at Buffalo is 103 Senaca st., Columbia building.

Fires and Accidents:—

Lambert Point Iron Works, at Norfolk, Va., burned, with $10,000 loss.

The Indianapolis Steel Roofing Co.'s plant was damaged $3,000 by fire.

The foundry department of the Lincoln Stove & Furnace Co., located in the State penitentiary yard near Lincoln, Neb., burned Oct. 26, with loss of $80,000. The contractors will lose upwards of $100,000 on product and machinery. The building was owned by the State.

The Mims Iron Works Co.'s foundry at New Orleans has been destroyed by fire, the principal loss being on patterns, equipment and stock.

Loss on the Hatch Cutlery Works warehouse fire at South Milwaukee was $3,000.

The West Muncie (Ind.) Tack and Novelty Works burned Oct. 22, with $20,000 loss, partly insured. It will be re-built.

Additions, Enlargements, Removals, Etc.:—

Probabilities are that the Litchfield (Ill.) Car Works will go to Memphis, Tenn.

Increasing business has led the W. H. Page Boiler Co., of Norwich, Conn., to make plans for a new foundry.

The Eureka Cast Steel Co., of Chester, Pa., are increasing their open-hearth plant to three times its former capacity.

General Industrial Notes:—

A new blooming mill to replace the one in the 28 inch mill is to be erected soon at Homestead.

The B. & O. railroad has placed an order for 500 tons of 85-pound steel rails for the Pittsburg division.

The Flemington Iron Foundry, at Flemington, N. J., has started up with a full force after nine months of idleness.

The Detroit Foundry Equipment Co. have received an order for two cranes of large tonnage to go to Amsterdam, Holland.

Roll casting at the Homestead Steel Works has proved a success. The second one was cast Friday of open hearth steel.

The last of three blast furnaces at the Edgar Thomson Steel Works, which have been out the greater part of a year, has been lighted.

The South Steel Mills, of the Lackawanna Iron & Steel Company, Scranton, Pa., resumed work last week with 800 men and boys.

The Junction Steel & Iron Mill, at Mingo Junction, O., closed down indefinitely. Six hundred men are thrown out of employment.

The Bessemer department and the rail mill of the Bethlehem Iron Works at Bethlehem, Pa., resumed last week after two months' idleness.

The Ohio Iron Co., Zanesville, O., are operating two mills non-union and white men have replaced the colored puddlers employed some time.

The Schultz Bridge & Iron Co., of Chartiers, Pa., has its plant running on full time, having enough orders on hand to keep it busy for some time.

The Whitely Malleable Iron Co.'s Works at Muncie, Ind., will be ready for operations about March 1. It has already a goodly number of orders booked.

The report that the Elba Iron Works, of Pittsburg will resume operations is denied. Receiver Eaton says that a start will probably not be made this year.

The Northwestern Malleable Iron Works, of Milwaukee, Wis., which closed down about two months ago on account of lack of orders, have resumed operations.

The Lloyd Booth Co., of Youngstown, O., has nearly a full force of men at work in its foundry and machine shops. Small orders have occupied them of late.

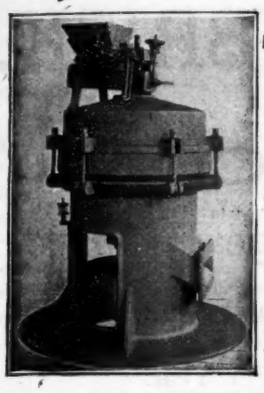
The plant of the Wellman Iron & Steel Co. at Thurlow, Pa., is again in operation. About 450 men, less than one-half of the ordinary force, were taken on.

Creditors of the Belleville (Ill.) Steel Co. agree to permit the works to start when citizens have brought the amount now being subscribed for liquidation, up to $15,000.

It is said that steel tubes about the size of a human hair, the hole in which can only be seen with a powerful glass, have recently been drawn by the Ellwood Ivins Tube Co., of Philadelphia.

The contract for the construction of three 5,000-horsepower dynamos for the Cataract Construction Co., at Niagara Falls, has been awarded to the Westinghouse Electric Co., of Pittsburg, for about $100,000.

No. 1 blast furnace of R. Heckscher & Sons, at Swedesland, Montgomery county, Pa., was blown out last week. The owners ascribe their action to the effects of the Senate's delay in repealing the silver purchasing clause of the Sherman bill.



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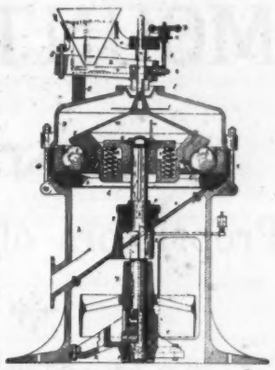

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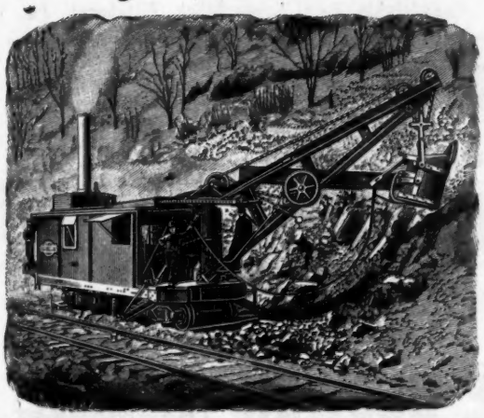

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and propose to blow out another furnace and close their plant entirely unless unconditional repeal is speedily passed.

The force at the Elmira Bridge Works is working full time, day and night, to catch up with orders. The bridge and construction department of the Pennsylvania Steel works is also very busy on bridge work.

Owners of the Excelsior furnace at Ishpeming, Mich., have been in that city looking over the plant preparatory to putting it in blast. It is stated that arrangements with Eastern capitalists make this possible.

The Neshannock furnace at New Castle, Pa., started up last week after an idleness of two months. This furnace is the property of the Shenango Valley Steel Co., and the product will be used at their steel mill.

A Niles, O., letter says that the puddlers at the Falcon and Russia mills have been working intermittently. All the sheet mills have been active the past two weeks. The Coleman Shields Co.'s mill has been idle for two weeks with no prospects of steady operation.

The knobbling department of the National Rolling Mill, McKeesport, Pa., will start this week with 12 fires, employing 100 men. The shut-down began in June. It is said that with the resumption of this mill every department in the National Rolling Mill will be in steady operation again.

The rolling mill of the Oxford Iron & Nail Co., of Oxford, N. J., was started last week. The entire plant will be put in operation at once, after being idle most of the summer. The men accept a reduction of from 10 to 25 per cent. These works when running full employ nearly 1,000 men.

The blast furnace of the Ohio Iron & Steel Co., at Lovellville, O., will be blown in this week and will furnish employment to about 100 men. Robert Bentley said that the old wages would be paid, but as to how long the furnace will run I cannot say. Our stock is quite low now and we only have a limited number of orders which we will fill for our regular patrons.

The Falls Hollow Stay Bolt Co., of Cuyahoga Falls, O., resumed operations on Oct. 1, after a shut-down of three weeks for repairs. The works have been enlarged and their capacity increased to meet the demands of a rapidly increasing business in the patent mandrel rolled hollow stay bolt iron.

Hereafter, all machines made by the Egan Co., of Cincinnati, builders of woodworking machinery, will have placed upon them a number, commencing from 50,000 and then onward. The immense output of machines made by this company requires this step, so that when repairs are ordered the mere mention of the number of the machine brings forward its record—that is, its pattern and class, for a complete record is made of every machine that goes out. Delays in getting repairs cannot now happen.

Suit has been begun at West Superior, Wis., against the West Superior Iron & Steel Co. by the Pittsburg Iron & Steel Engineering Co. to recover $61,615, which is a balance due on an account of $349,600. The plaintiffs put up the large steel plant on a contract, and all was paid but the amount sued for. The company made an assignment several months ago and have been closed since. The plainliffs set up that their work was performed and material supplied before the bonds were issued, and claim priority over the bondholders. The bonds were negotiated by the New York Central Trust Co.

The Locust Point, Md., Iron & Steel Mfg. Co., which operated a large tin mill, passed into the hands of receivers Oct. 26. George W. P. Coates, a stockholder in the company, and Frank Ehler are the receivers. The company manufactures iron, tin and steel, and the directors say the manufacture of tin has been profitable. The prevailing monetary stringency and the uncertainty as to what Congress will do with the tariff are given as the reasons for the company's

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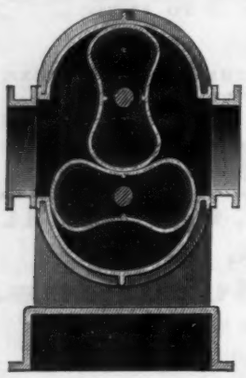

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troubles. The works will probably be continued. The company's capital is $100,000 and the liabilities are small.

The Adams water tube boiler for the utilization of waste heat, manufactured by Chas. P. Adams, of Cleveland, is familiar to readers of this paper, a complete description having appeared in these columns some time ago. Several of these boilers have been installed recently in important mill plants: two of 150 h. p. each on heating furnaces in the rolling mill department of the National Tube Works Co., McKeesport, Pa.; three of 100 h. p. each on single puddling furnaces at Howe Brown & Co.'s mills, Pittsburg, and one of 100 h. p. to utilize the waste heat of two single puddling furnaces at the Ætna-Standard Iron & Steel Co.'s mills at Bridgeport, O. Mr. Adams' office is in the Cuyahoga building, Cleveland.

James Leffel & Co., Springfield, O., recently shipped to Niagara Falls a 30-ton water wheel, horizontal shaft, of the type known as the James Leffel double discharge turbine. Water will be conducted to the wheel from a canal at the top of the cliff by a 8-foot pipe, extending downward until it reaches the mill, located near the foot of the cliff. The water will enter the cylinder casing of the wheel from below, passing upward a few feet, filling the case, and thus obtaining the head pressure. The amount of head will be about 130 feet; the wheel being some 67 inches in diameter, a speed of 225 revolutions will be obtained and almost or quite 1,200 horsepower developed.

The future of the steel plant at West Superior is entirely dependent upon an improvement in general industrial conditions. W. Van Norden, of New York, president of the Land & River Improvement Co., said at Superior, the other day: "The Land Company will get the plant into the hands of parties who will operate it as soon as possible. It is a costly plant and we cannot afford to let it stand idle and besides it must be operated in the interests of the city. Probably the sale announced to take place next month will be postponed, but the Land company has not lost sight of the great importance of lifting the plant out of the financial tangles it is now in."

In the Wheeling district: The Ætna-Standard continues to run almost full throughout. . . . The Wheeling Corrugating Co. has only about a half force at work. . . . Allison's Wire Works is making full time, but only about one-half the usual force of men is employed. . . . The Junction Steel & Iron Co. have shut down indefinitely. No cause other than the unsatisfactory condition of trade is given. . . . All four of the Riverside plate mills are going. One lap weld, one butt weld and one bell weld furnace in the tube works are going. The Steel plant resumed operations this (Thursday) morning. Both blast furnaces are still idle, but the Riverside will probably get started up in a couple of weeks.—[Ohio Valley Manufacturer.

The Largest Edgar Thomson Outputs.

In the last of his series of articles "From Mine to Furnace," published in *Cassier's Magazine*, Mr. John Birkinbine says: "Probably no better illustration of the development of the blast furnace can be offered than the following memoranda concerning the largest plant in Pennsylvania, viz., that of the Edgar Thomson steel works, consisting of nine blast furnaces, which can produce together over 2,000 tons of pig iron daily, and which have averaged a total output of between 1,500 and 1,600 tons per day. One of these furnaces, which completed thirty-seven months of its present blast in April, 1893, had made in that time 370,000 tons of metal, and was running at the rate of 11,000 tons per month. The furnaces are 80 feet high with boshes 20 feet, 22 feet and 23 feet in diameter, and

90 feet high with boshes 22 feet in diameter. Thirty large blowing engines supply blast for this group of furnaces. One hundred and twenty boilers furnish steam to drive the blowing engines, the pumps and hoisting appliances, and twenty-four pumps are in constant use furnishing water. Thirty-three hot-blast stoves heat the air supplied. One of these furnaces has reached the remarkable output, for a single day, of 623 gross tons of iron; in a week one furnace stack has made 3,023 gross tons, and in a month one stack produced 12,800 gross tons; that is, in one month, one of these furnaces produced fully as much iron as twenty-five years ago would have been turned out in a year from the best and largest of the American blast furnaces."

THE Lane & Bodley Co., of Cincinnati, O., within the last two weeks have shipped a center crank engine and a slide valve engine to Cuba. This company has been fortunate in securing a goodly number of foreign orders, an increasing evidence of the reputation they have gained for their engines.

THE production of pig iron in Germany for the eight months ending August 31 is reported at 3,135,679 tons, a decrease of 55,509 tons, or 1.8 per cent, from the corresponding period in 1892.

ABOUT 500,000 Columbian half dollars still left. The issue was not popular.

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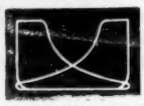
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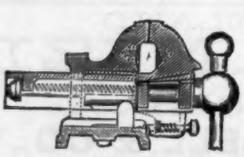

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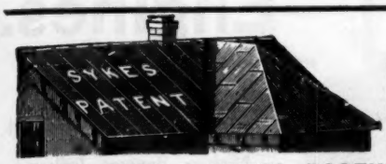

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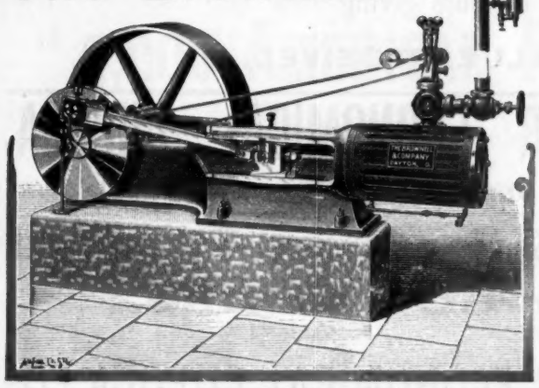

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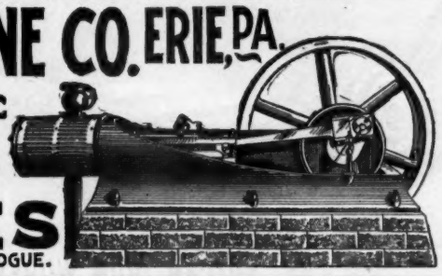

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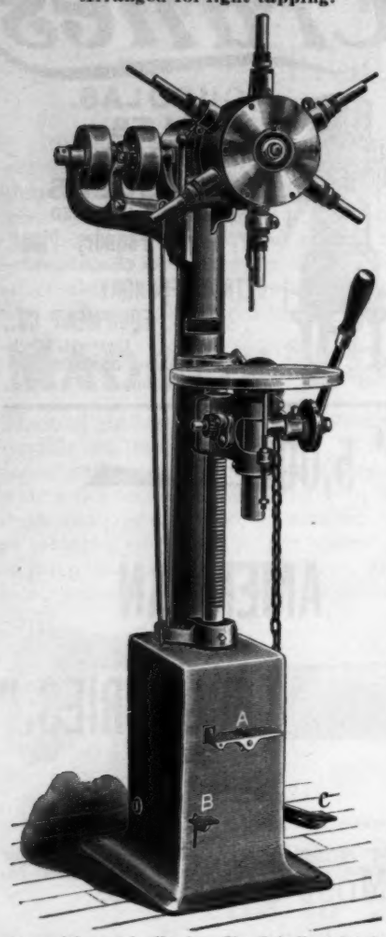

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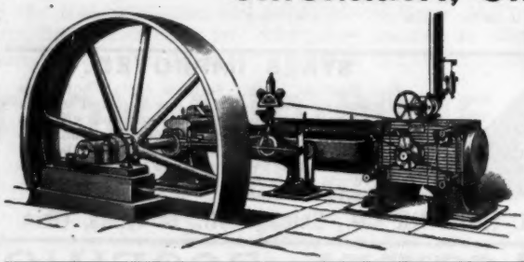

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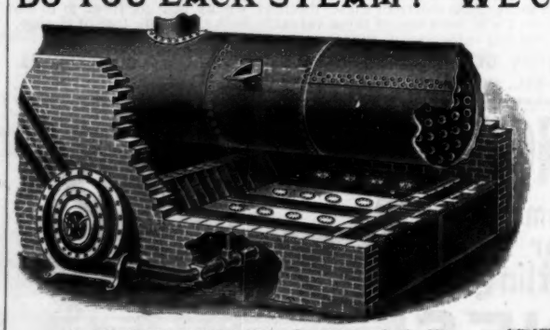

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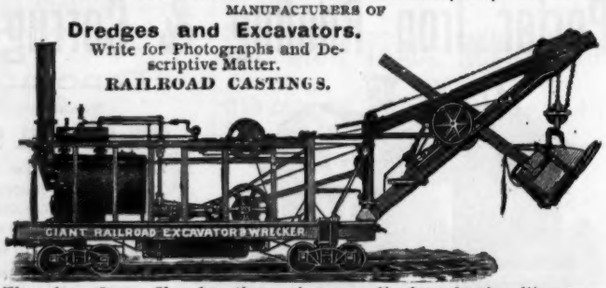

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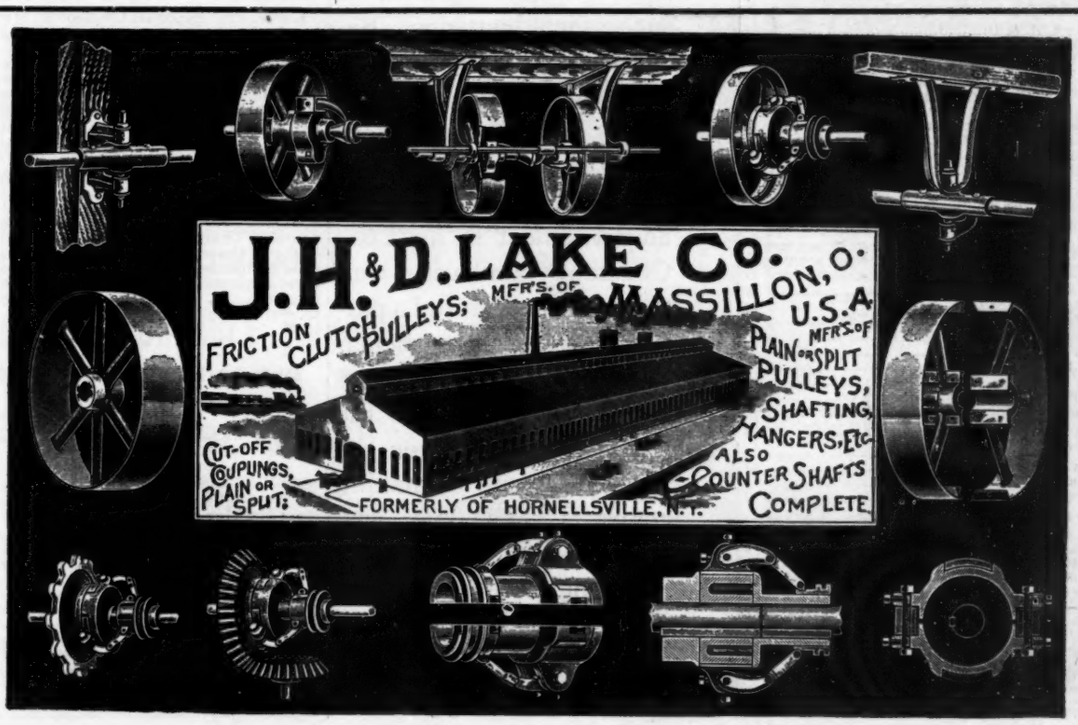

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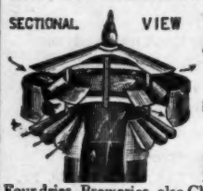
*Foos Mfg. Co.	19
Fulton Steam Boiler Works & Foundry	27
Garden City Sand Co.	17
Gerlach, Peter & Co.	22
Gordon Hollow Blast Grate Co.	22
Graves Elevator Co.	20
Green, H. N.	20
Greiner Ecomomical Cupola Co,	22
Haldeman & Co., N. A.	21
Harrington & King Perforating Co.	30
Hartford Steam Boiler Insp. & Ins. Co.	31
Haven Co., The James L.	32
*Hendrick Mfg. Co., Ltd	—
Hercules Powder Co	28
†Higley Sawing & Drilling Machine Co.	31
Hill, Clarke Co.	28
*Hodell, H. H. & Co.	19
Hunt & Co., Robert W.	2
Iron Clad Paint Co.	29
Jeffrey Mfg. Co.	1
Jenks, James	32
Jessop & Sons, Ltd., Wm	22
Jones & Co., B. M.	2
Jones, E. H. & Co.	32
Jones, Richard O.	20
Kilbourne & Jacobs Mfg. Co., The	2
Lake Co., J. H. & D.	25
*Lake Shore Iron Works	—
Lane & Bodley Co., The	22
Lawrence & Co., W. W.	23
Lloyd Booth Co	30
Lord, G. W.	21
Magnolia Anti-Friction Metal Co.	1
McCormick Co., The J. S.	1
*Merchant & Co.	26
Milton Mfg. Co.	26
Murdock, Jr., Jas.	30
National Photo-Engraving Co.	23
Obermayer Co., The S.	1
Oglebay, Norton & Co.	19
Otto Gas Engine Co.	30
Outhwaite, J. H. & Co.	19
Parker, Richard A.	22
Penberthy Injector Co.	19
Pemberton, Geo.	32
*Pneumatic Watchman Check Co.	—
Pollock, Wm. B. & Co.	2
Pool, F. J. & H. R.	1
Pope, E. C.	19
Porter Iron Roofing & Corrugating Co.	21
Prentiss Tool & Supply Co.	19
Quint, A. P.	22
Rainey, W. J.	2
Ravenna Boiler Works	32
Richards, M. V.	25
Robinson & Orr	2
‖Sharon Fire Brick Works	—
Skinner Engine Co.	21
Spence & Son, L.	2
*Spicer Mfg. Co., The	20
Stilwell & Bierce Co.	2
‖Stowe Fuller & Co.	—
Sturtevant B. F. Co.	27
Sykes Iron Roofing Co.	21
Taylor & Boggis Foundry Co.	1
Tod, Wm. & Co.	30
Toledo Machine & Tool Co.	31
*Trenton Iron Co.	—
Union Electrotype Foundry	25
Union Mining Co.	18
Upson Nut Co.	30
Van Duzen Gas Engine Co.	2
Vulcan Iron Works	22
Weber Gas & Gasoline Engine Co.	1
Wells Engine Co.	23
Weston Engine Co.	1
Whitman & Barnes Mfg. Co.	18
*Wilhelm & Co.	31
*Williams Bros.	—
Worthington, Henry R.	19

The "STAR VENTILATOR"

SECTIONAL VIEW



Galvanized Iron, Copper or Brass.

Down Draughts Prevented.

For Ventilating Mills, Factories, Foundries, Breweries, also Churches, Schoolhouses, Theatres—in fact all kinds of buildings, none equal the "Star."

A cheap Ventilator which will not do the work required, is costly at any price; our claim for Superiority of the "Star" Ventilator is based on Merit only—believing the first cost to be a secondary consideration.

Send for a copy of our little book on Ventilation.

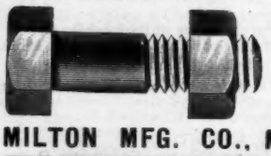
MERCHANT & CO.

Philadelphia. New York. Chicago. London.

MACHINE BOLTS.

Hot Pressed Nuts, Wrought Iron

WASHERS



Highest Standard of Excellence.

Send for Prices.

MILTON MFG. CO., Milton, Pa.

PERSISTENCE

is a foremost element of success in advertising. Because the reader of an advertisement is not in a humor to buy when he sees it the first time, is not conclusive of the value of that advertisement in his case. Constant familiarity with the announcement of a particular boiler, a particular engine, a particular machine tool, brings the maker to mind when the time does come for making contracts. The men who make freest acknowledgment of their obligation to advertising are the ones who have

Kept Everlastingly at It.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Low Phosphorus Bessemer	$4.15@$0.00
No. 1 Specular, Bessemer	4.00@ 0.00
No. 1 Bessemer hematite	3.50@ 3.75
Hematites No. 1 non-Bessemer	2.75@ 3.25
No 1. Specular, non-Bessemer	3.00@ 3.50

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$12 00@ 00 00
No. 1 Strong Foundry	12 50@ 13 00
No. 2 Strong Foundry	11 50@ 12 50
No. 1 Grey Forge, red short	11 50@ 12 75
No. 2 Gray Forge, neutral	11 25@ 11 50
No. 1 American Scotch	13 50@ 00 00
No. 2 American Scotch	12 50@ 00 00
Lake Superior Charcoal	15 00

PITTSBURGH (reported by A. H. Childs):

No. 1 Foundry	$12 50@$13 00
No. 2 Foundry	11 50@ 12 00
Grey Forge	11 00@ 11 50
White and Mottled	10 75@ 00 00
Warm Blast Charcoal	18 00@ 21 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	11 75@ 12 50

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$16 00@$16 50
Local Coke Foundry No. 1	13 50@ 14 00
Local Coke Foundry No. 2	12 75@ 13 00
Local Coke Foundry No. 3	12 50@ 12 75
Local Scotch Foundry No. 1	14 00@ 14 50
Local Scotch Foundry No. 2	13 50@ 14 00
Local Scotch Foundry No. 3	13 00@ 13 50
Southern Coke No. 1	14 10@ 14 35
Southern Coke No. 2	12 35@ 12 60
Southern Coke No. 3	11 85@ 12 10
Southern No. 1 Soft	12 35@ 12 60
Southern No. 2 Soft	11 85@ 12 10
Southern Silveries No. 1	14 50
Southern Silveries No. 2	13 50
Ohio Silveries No. 1	16 50@ 17 00
Ohio Silveries No. 2	16 25@ 16 75
Ohio Strong Softeners No. 1	15 50@ 16 00
Ohio Strong Softeners No. 2	15 50@ 16 00
Tennessee Charcoal	16 00@ 16 50
Alabama Car Wheel	18 50@ 18 75

CINCINNATI (reported by Rogers, Brown & Co.):

Southern Coke No. 1, Foundry	$12 75@$13 00
Southern Coke No. 2 and No. 1 Soft	11 00@ 11 25
Hanging Rock Coke, No 1	14 50@ 15 00
Hanging Rock Charcoal No. 1, Fdy	18 50@ 19 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	15 50@ 16 00
Southern Coke, Grey Forge	10 00@ 10 25
" " Mottled	9 75@ 10 00
Standard Alabama Car Wheel	17 50@ 18 00
Tennessee " "	16 00@ 16 50
Lake Superior " "	17 00@ 17 50

BUFFALO (reported by Rogers, Brown & Co.)

Mahoning and Shenango Valley, strong, No. 1 Foundry	$13 75
Mahoning and Shenango Valley, strong, No. 2 Foundry	13 25
Ohio Softener No. 1	14 00
Ohio Softener No. 2	13 00
Jackson Co. Silvery, No. 1	$16 80@ 17 30
Jackson Co. Silvery No. 2	15 00@ 16 00
Lake Superior Charcoal	15 75
Tennessee Charcoal	16 00
Southern Softener No. 1	13 15
Alabama Car Wheel	18 00
Hanging Rock Charcoal	20 50

LOUISVILLE (reported by Geo. H. Hull & Co.)

Southern Coke No. 1 Foundry	$12 50@$13 00
Southern Coke No. 2 Foundry	11 25@ 11 75
Southern Coke No. 3 Foundry	10 75@ 11 00
Grey Forge	10 25@ 10 75
Spathite	12 00@ 12 50
Southern Charcoal No. 1 Foundry	15 00@ 16 00
Car Wheel	17 50@ 17 75

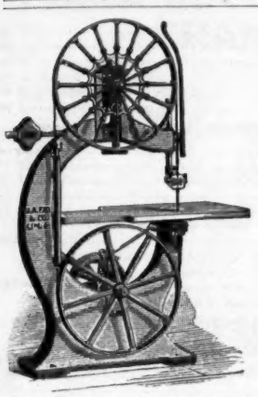
ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$13 25@$13 50
Southern Coke No. 2	11 75@ 12 00
Southern Coke No. 3	11 25@ 11 50
Southern Grey Forge	10 50@ 11 00
Southern Charcoal No. 1	15 50@ 16 00
Missouri Charcoal No. 1	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	17 50@ 18 00
Southern	17 50@ 18 00
Connellsville Coke, St. Louis	5 00

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$18 00
Old steel rails	13 50
	NET TONS
No. 1 R. R. wrought scrap	$12 00
No. 1 wrought scrap	12 00
No. 1 Machine cast scrap	10 00
Iron axles	17 00
Axle turnings	11 00
Wrought turnings (free from cast)	9 00
Cast borings	6 50
Uncut wrought iron boilers	5 00
Steel boiler Plates	10 00
Grate bars	5 00
Pipes and flues (clean)	9 00
Tank iron	8 00
Hoop and band iron	7 00
Sheet iron	7 00
Wrought drillings	7 00
Malleable iron	8 50



BAND SAWS—TWELVE STYLES.

J. A. FAY & EGAN CO.,

251 to 271 W. Front St., CINCINNATI, OHIO.

OWNERS AND OPERATORS OF

J. A. FAY & CO. THE EGAN CO.

1835 ESTABLISHED 1873

Originators and Constructors of

WOOD-WORKING MACHINERY.

MEDALS FOR SUPERIORITY OVER ALL COMPETITORS.

350 awarded us by the various expositions in this country and abroad.

"GRAND PRIX" by the Universal Exposition, Paris, 1889.

Decoration of the **"Legion of Honor"** conferred by the French Government.

HAND PLANERS—20 SIZES AND KINDS.

PERFORATED METALS

OF ALL KINDS FOR

MILLING MINING AND AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.

LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

THE ROBERT AITCHISON. PERFORATED METAL CO.,

OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

BEING IN THE BOILER BUSINESS.

MAKING STATIONARY TUBULAR BOILERS EXCLUSIVELY.

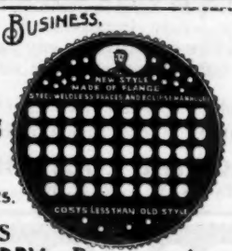
WE CAN MAKE A BETTER **BOILER** AND ALTHOUGH WE MAKE THEM OF

FLANGE STEEL WITH **WELDLESS BRACES** AND **ECLIPSE MANHOLES**

SELL THEM FOR LESS MONEY THAN OLD STYLE ONES.

WE FURNISH NEATER LITHOGRAPHS AND DETAIL ILLUSTRATIONS OF THIS CLASS OF BOILER THAN ANY FIRM IN THE UNITED STATES

FULTON STEAM BOILER WORKS AND FOUNDRY, RICHMOND, IND.



THE STURTEVANT

IMPROVED PORTABLE FORGES.

PRESSURE BLOWERS

For Cupola Furnaces and Forges.

The Sturtevant System of Heating and Ventilating Manufacturing Establishments.

B. F. STURTEVANT CO.,

BOSTON, MASS. (2)

1 Liberty St., NEW YORK. 16 So. Canal St., CHICAGO. 135 No. Third St., PHILADELPHIA.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.60c@1.70c
Angles	1.50c@1.60c
Tees	1.80c@1.90c
Universal Plates	1.60c
Sheared Plates	1.70c

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
4¼ to 6 by ⅜ to 1 inch	1 65
1½ to 6 by 1⅛ to 2 inch	1 80
1¼ & 1⅜ by ⅜ to ¾ inch	1 65
1 & 1⅛ by ⅜ to ¾ inch	1 70
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 80

Round and Square.

1 to 1⅞ inch	1 60
2 to 2⅝ inch	1 70
2¾ to 3¼ inch	1 85
3⅜ to 4 inch	2 10
4⅛ to 4½ inch	2 79
4¾ to 5 inch	2 95

Oval.

⅞ to 1¼ inch	1 80
⅝ to ¾ inch	1 80
½	2 00
⅜	2 20

Half Oval and Half Round.

1½ to 3 inch	2 15
⅞ to 1½ inch	1 95
⅝ to ¾ inch	2 20
½	2 35
⅜	3 45

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 70
1 to 1⅜ by ¼ and 5-16 inch	1 75
¾ to ⅞ by ¼ and 5-16 inch	1 85
½ to ⅝ by ¼ and 5-16 inch	2 10

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7 16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2 40
1 7-16 to 2, No. 22	2 50
1⅛ to 1⅜, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to 1⅜, No. 21	2 40
1⅛ to 1⅜, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 25
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16. 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16 No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅝, No. 13, 14 and 15	2 90
⅝, No. 16, 17 and 18	3 00
⅝, No. 19 and 20	3 10
⅝, No. 21	3 20
⅝, No. 22	3 30
⅝, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16, No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
⅜, No. 13, 14 and 15	3 80
⅜, No. 16, 17 and 18	3 90
⅜, No. 19 and 20	4 00
⅜, No. 21	4 30
⅜, No. 22	4 40
⅜, No. 23	4 55

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 90
1½ to 6 by Nos. 11 and 12	1 95
1 to 1⅜ by ⅛ to 3-16 inch	1 95
1 to 1⅜ by Nos. 11 and 12	2 00
⅞ and 13-16 by ⅛ to 3-16 inch	2 10
⅞ and 13-16 by Nos. 11 and 12	2 15
¾ and 11-16 by ⅛ to 3-16 inch	2 20
¾ and 11-16 by Nos. 11 and 12	2 25
⅝ and 9-16 by ⅛ to 3-16 inch	2 35
⅝ and 9-16 by Nos. 11 and 12	2 45
½ by ⅛ to 3-16 inch	2 50
½ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 10
⅞ inch, " " " " 13 and 14	2 20
¾ inch, " " " " 11 and 12	2 25
¾ inch, " " " " 13 and 14	2 45

Sheet Iron.

No. 10	2 15
No. 12	2 20
No. 14	2 25

Brainard Milling Machine Co.

EXHIBIT AT

- Machinery Hall, World's Fair, -

COLUMN K 39.

Plain and Universal Milling Machines,

Automatic Gear Cutting Machines,

Special Cam Cutting Machines.

These machines can be seen in operation.

WORKS AT HYDE PARK, MASS.

CHICAGO OFFICE, 14 S. Canal St.

BOSTON OFFICE, 156 Oliver St.

THE ADAMS
WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below:

The Falcon Tin Plate & Sheet Co.,
NILES, O., Aug. 18, 1893.

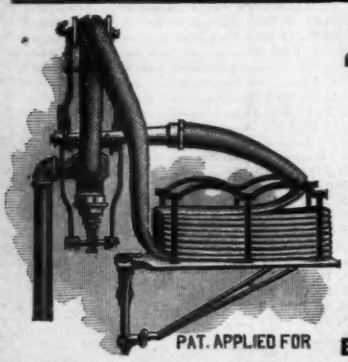
Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.

807 The Cuyahoga, - CLEVELAND, O.



The "Birdsall" Automatic Hose Valve.

WE CLAIM FOR THE

"BIRDSALL" AUTOMATIC HOSE VALVE

1st. That it is instantaneous in its action.

2d. As soon as hose is laid out the valve is fully open without any other manipulation.

3d. Time wasted in making connections and opening valves by hand is avoided.

4th. Always ready, impossible to use it wrong, and is therefore operative by any person.

5th It is durable, ornamental, and reasonable in cost.

6th. It is adapted to any place where hose is used.

Agents wanted. For further information address

BUFFALO FIRE EQUIPMENT CO.,
BUFFALO, N. Y. E. M. Birdsall, M'g'r.

HERCULES POWDER

SEND FOR DESCRIPTIVE PAMPHLET.

Stump before a blast. | Fragments after a blast.

HERCULES, THE GREAT STUMP AND ROCK ANNIHILATOR.

STRONGEST and SAFEST EXPLOSIVE

Known to the Arts.

POWDER, FUSE, CAPS,

Electric Mining Goods,

AND ALL TOOLS FOR STUMP BLASTING,
FOR SALE BY THE
HERCULES POWDER COMPANY,
40 Prospect Street, Cleveland, Ohio.
J. W. WILLARD, Manager.

No. 15-17	2 35
No. 18	2 50
No. 20	2 60
No. 22-24	2 70
No. 25 26	2 80
No. 27	2 90

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 c0
Shell	2 25
Flange	2 50
Marine Flange	2 75
Fire Box	3 75

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½
7-16 to ⅜ and 2⅛ to 3 in.	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4⅛	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
3-16 in	13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to 5/8 thick	8

Bessemer and O. H. Steel.

Machinery	base price, 2 10
Tire	" 2 25
Spring	" 2 50
Sleigh Shoe	" 2 50
Toe Calk	" 2 35
Cutter Shoes, tapered and bent	" 2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 80
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 50

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths'	Hill's dis 40
	Bullock's dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 30
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ 1b 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 to Flour, C. F		
	46 gr.	150 gr.	F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

FRANK R. BIEDLER,

(PRINCIPAL)
Baltimore Offices,
Moore Building,
S. E. Cor. Baltimore and Hanover Sts.

(BRANCH)
New York Offices
Welles Building,
18 Broadway.

MINING, MINERAL AND TIMBER LANDS

Municipal Bonds,
Farm and City Mortgages,
Short Time Paper.

Large Tracts of Florida Phosphate and Hammock Lands.

EXAMINATIONS AND REPORTS MADE.

☞Correspondence Solicited.

THE GRIFFIN MILL

The Only Perfect Pulverizer

OF QUARTZ, GOLD OR SILVER ORES, PLUMBAGO, PORTLAND CEMENT,

OF PHOSPHATE ROCK, FOUNDRY FACINGS, And All Other Refractory Substances.

Will work either wet or dry, and deliver a finished product. Capacity, 3 to 4 tons per hour on Phosphate Rock, 1½ to 2 tons per hour on Portland Cement, Quartz or Ores, depending on hardness of material to be pulverized and fineness of product Grinds from 30 to 250 Mesh with equal facility.

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" X. P.	dis 25
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Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	15c
" " " " over 5 lbs	12c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¾	3½
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In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

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List July 14, 1887	dis 75
Standard Penny Nails, ₩ keg card rate	
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Brass and Copper	dis 50
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Packing, Steam.

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American Packing Hemp	₩ lb 9@10
Russia " "	₩ lb 14
Italian " "	₩ lb 13@19
Plumbago Piston	₩ lb 40
Peerless	₩ lb 60
Morrison's "	₩ lb 50
Square Flax "	₩ lb 50
Sheet Rubber	₩ lb 12&24
Excelsior Rubber	₩ lb 48
Rainbow: Full Rolls	45c ₩ lb
Rainbow: Less than Full Rolls	50c ₩ lb
Eclipse Gasket	₩ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 40
Medart Pulleys	dis 50
Split Wood Pulleys	dis 50@55

Rivets.

Iron, Thousand, list November 17	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
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No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

	New List, Jan. 18, 1884
Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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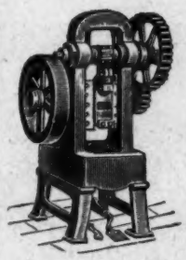

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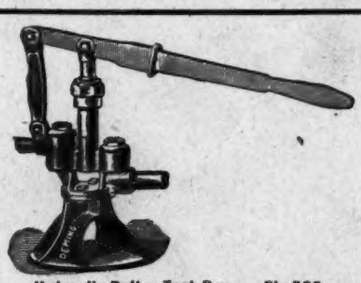

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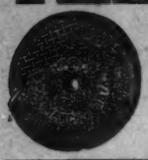

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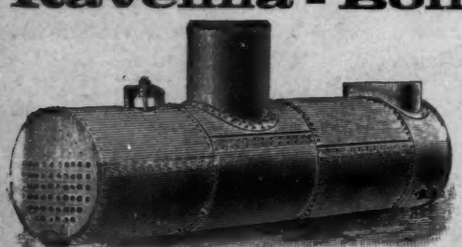

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